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OUTLOOK

By Bruce F. Shank, Editor

The time to evaluate employee development is here. We need to take a serious look at our investment in good people and to challenge old attitudes about loyalty, education, and advancement.

During a recent discussion with Green Industry managers I detected a serious unwillingness to pay for the education of anyone under the management level. Furthermore, this unwillingness represents a roadblock to advancement in technical areas, since managers are almost entirely concerned with business topics and not agronomic or horticultural matters. Sure, large companies provide technical training, but what about those small to medium size firms who can't afford a technical staff?

Until someone can prove the financial benefits of well-trained crew members, I suspect that this tightness will continue. Will a manager invest $2,000 in an employee's technical advancement unless he can realize benefits which exceed that amount? Probably not.

The reasons stem from employee turnover, a lack of interest in education by many employees, and confusion over how to pay or utilize the better educated person.

The good employee is being penalized by this confusion and is likely leaving the industry for another field where employee investment is practiced.

Every company, no matter the size, should have one or two persons in a development track, both technologically and businesswise. These persons should either have been hired with an appropriate education or are in the process of being improved by company investment in education. There is no guarantee for keeping that person, but he should be brought along regardless. There are no sure things in this world.,

If he leaves, you should quickly replace him and maintain your development program. Because, when the manager leaves, someone is there that knows the company from the inside, knows the customers, and can keep momentum up until he is either promoted to the management position or a new manager is hired.

There is another good reason to invest in education. There is pressure on many public universities to cut out unwanted programs. If you support these universities with your educational program, you not only

end up with a better employee, insurance against management turnover, and better morale, but you assure the industry of educational support in the future.

WT&T

LETTERS

This letter is in response to Edward P. Milhous' comments related to Silver Maple. The article written in the January issue was designed to point out the desirable characteristics of trees and stimulate thinking. I was pleased to see it has done both. I suggest that one read the article carefully.

Silver Maple does not fit into every situation, but if one realizes it is a high maintenance tree and provides that needed level of maintenance, it has potential in the urban landscape. For example, pruning on a two- to three-year cycle reduces the incidence of heartwood decay (Silver Maple is a poor compartmentalizer), while correcting structural problems. If one can still consider American Elm a desirable tree with its weak wood, insect problems, damage to the sidewalks, as well as heartwood decay (slime flux), while considering disease problems (UED), then one must rethink Silver Maple. Both trees thrive in the urban landscape.

Silver Maple, if one understands the plant's requirements, has a place in the urban environment. It is high maintenance but grows in flood plains and lake bottom soils which comprise many of our cities, e.g. Chicago, Cincinnati, Midland, MI, etc. Further, Silver Maple has shown tolerance to air pollutants (e.g sodium dioxide and PAN) and sodium chloride. It was recently brought to my attention that one of the conclusions of the 1979 Cleveland meeting of METRIA was that professionals in the field of urban forestry and horticulture again look at Silver Maple, its adaption in the urban landscape with an eye towards developing improved selections. No individual tree is perfect for every site.

A good dialogue between professionals actively involved with landscape maintenance who can assess plants' desirable and undesirable characteristics will advance the field of horticulture and lead to trees which will tolerate today's urban conditions.

Douglas J. Chapman
Horticulturist
Dow Gardens, Midland, MI

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Immaculate weed-free turf is the key to profit for the Lawn Care Operator

Read how Trimec® Turf Herbicide can help you improve the bottom line

As a lawn care operator, you live in a glass house, and this has a direct bearing on your profits. Some businesses can hide their mistakes, or shift the blame, or postpone the consequences, thus buying time to make corrections later when they're not so busy.

But not you!

If a few ugly weeds appear out of nowhere in one of your lawns, or if some trees and ornamentals show signs of damage, the finger points to you; you've got to do something right now or you may lose a customer as well as your chances for new customers in the block.

Fortunately, there's another side to the coin. If one of your lawns is as immaculate as a country club fairway, everyone in the block sees it and becomes a prospect for you.

The point is, you've got to do the job right the first time. You absolutely can't tolerate the emergence of stray weeds or damaged ornamentals.

STRAY WEEDS: The weeds that plague lawn care operators are not dandelions or chickweed or other common sensitive weeds. To the contrary, they invariably are a hard-to-kill variety usually thought to be rare — until they showed up in your customer's lawn!

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GREEN INDUSTRY NEWS

EQUIPMENT

Equipment theft cuts into dearer profits, answers needed

Manufacturers are groping for solutions and contractors grow angrier as losses from equipment theft cut deeply into profits.

Discussion continues among manufacturers and their trade associations, contractors have united in crime prevention committees, insurance companies raise premiums, and legislation is set before Congress. Yet no program has been established that will stop the millions lost through theft of construction equipment.

The most recent figures from the Associated General Contractors show that the value of stolen heavy construction equipment in 1978 totals $341,850,000. This averages to a loss of $10,425 per contractor. But some think that this is a small estimate of the actual loss.

Jim Supica, president of United Construction Co. in Overland Park, KS, thinks that the loss of time and work through missing equipment, although impossible to calculate, would significantly increase the original total. "It is an inflationary problem we're dealing with constantly," he says.

Supica is also chairman of the General Contractors crime prevention committee, which has 112 chapters in major cities and states. Some chapters have operation identification programs in which they put numbers on machines to identify them. Serial numbers are normally not stamped into equipment and criminals find them easy to change or remove.

The biggest problem is in the Southwest and southern Texas area, close to hijacking grounds at the Mexican border. "The situation on the West coast is really trouble for the landscape industry," says Joe Brazan of the California Landscape Council. Losses from equipment theft in California alone totaled $24,000,000 for 1978.

A member of the Farm & Industrial Equipment Institute said that the best way manufacturers have of coping with the problem is working with law enforcement agencies for some method to stop theft. But there is no active program and little they can do now, he said. Caterpillar does use a computerized system for tracking machines all over the world through discreet serial numbers.

Supica says that manufacturers could be doing a lot more. With the advanced technology built into machinery design, he thinks they could develop a system to make equipment more theft proof. "I would encourage contractors to support such a system," he says, even if it raised the price.

Brian Deery, secretary of the crime prevention committee, says manufacturers response to anti-theft devices is that 'if you want them, you can get them as an option with the machine.' Some manufacturers do offer them as an option.

The committee is also interested in protecting insurance companies, which would protect themselves, and train police officers. Representatives from chapters have gone to police academies to explain equipment and where to find serial numbers. General efforts include better lighting on the job site, fences, and moving equipment to central locations at night. The FBI, which has the resources for action, has promised to do something. It would like manufacturers to draw up a certificate of origin, hopefully unforgable, which

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1980 Officers for the National Arborist Association include: (seated, left to right) President-Elect Walter Money, Rockville, MD; President Bruce Walgren, W. Hartford, CN; Vice-President Eric Haupt, Sheffield, MA; and Secretary Lee Lesh, Saratoga, CA; (standing left to right) Treasurer Robert Mullane, White Plains, NY; Past President Larry Holkenborg, Sandusky, OH; Director Neil Engledow, Indianapolis, IN; Director George Tyler, Amherst, NH; and Director Robert Bartlett, Stamford, CN.

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LANDSCAPE CONTRACTOR NEWS

Construction conference shows lack of unified solution to economy

Congressmen, representatives of executive agencies, and contractors could not agree on solutions to the economy at the Construction Industry Legislative Conference held in Washington, DC, in March. Although together in a spirit of mutual benefit, the various groups were divided over the proper answers.

Congressmen, in particular, presented a wide spectrum of plans to 550 members of construction trades (17 from ALCA). They expressed various opinions on the appropriateness of a tax cut and other suggestions to halt inflation.

The consensus of executive agency people, such as the EPA and USDA, was that the mild recession the country is in now will end in the third quarter of this year. A member of the Office of Management and Budget said that inflation this year will hover between 11 and 12 percent.

Contractors agreed that finding work is no problem, but getting financed is. A boost in money supply will pick the industry up.

Interior landscape directory available

The Interior Landscape Div. of ALCA has published its new directory of interior landscape contractors, "Who's Who in Interior Landscaping," which includes listings for some 100 of the leading interior landscape firms across the country.

Listings contain the basic information to contact each company along with the contractor's specialties and a categorized firm size. It also tells the officers of the I.L.D.

The 16-page booklet is available from: ALCA Interior Landscape Div., 1750 Old Meadow Road, McLean, VA 22102. There is no charge but requestors are asked to send a self-addressed business (#10) envelope.

Students publish landscape newsletter

The ALCA student chapter at Mississippi State University has published a newsletter which is being distributed to all graduates in landscape contracting from the university from 1973-79.

Features include guest speakers on campus from the industry, graduates in the curriculum, awards received by instructors for landscape, companies sponsoring scholarships, and more.

Industry firms are welcome to subscribe. Funds from the newsletter will be used for student field trips, attendance at industry meetings, and publication of the 1980 graduate directory. Write to: MSU/ALCA Student Chapter Newsletter, P.O. Drawer MQ, Mississippi State, MS 39762.

News *from page 10*

would provide a paper trail wherever the equipment goes.

One thing manufacturers and contractors seem to agree on is that neither want more government rules and regulations, which the Motor Vehicle Theft Prevention Act of 1979 would likely bring. "Manufacturers realize that if the situation continues, there'll be legislation that'll force things down their throat," says Deery. "They don't want that and neither do we."

FERTILIZER

Fertilizer embargo could hurt U.S. growers

The U.S. embargo against fertilizer exports to the Soviet Union could cause higher fertilizer costs for American farmers this year, many experts believe.

The reason is that the U.S. also buys fertilizer from the Soviets. U.S. exports consist of phosphoric acid, a source of phosphate fertilizer. The Soviet Union sells the U.S. anhydrous ammonia, which yields nitrogen.

If the Soviets ban shipments of ammonia, it would sharply increase nitrogen prices and U.S. farmers use twice as much nitrogen as they do phosphates. Prices "would simply explode," says Larry Jones, an economist with Chase Econometric Associates Inc. He figures that nitrogen prices could jump 40 percent by June 1981.

The Wall Street Journal reported this and said, "U.S. fertilizer producers, rendered cautious by the boom-and-bust nature of their business, which went through a bust phase two years ago, are careful about predicting a renaissance for U.S. ammonia producers in the event of a Russian ammonia cutoff. Increased demand for U.S.-produced ammonia could spur the reopening of some of the 23 idle ammonia plants in this country, analysts say."

PARKS

More than 300 attend park training program

With the theme, "Strategies for effective management," the Great Lakes Park Training Institute held its thirty-fourth annual session of talks and workshops at Pokagon State Park, Angola, IN.

Ralph Wilson, chief recreation specialist of the Soil Conservation Service, USDA, gave the keynote address on "So you think you are a professional." Other sessions dealt with maintenance efficiencies, use of volunteers, vehicle problems, turfgrass and groundcover for fuel efficient maintenance, and topics concerning park directors. The Heritage Conservation and Recreation Service simulated a meeting between park people and leaders of a

Continues on page 43

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The 3-wheel model gives you the maneuverability of a tight 17′ turning circle, while the 4-wheeler has seating room for two. And it just takes minutes to

add any of the Turf-Truckster's accessory pieces, thanks to Cushman's pin-disconnect system. No bolting, no hitching. Just snap two or three pull pins in place and you're ready to hit the turf.

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EUROPEAN BEECH CULTIVARS HAVE ADVANTAGE OVER AMERICAN

By Douglas Chapman, Horticulturist, Dow Gardens, Midland, MI

American or European Beech can be an exciting addition to the landscape if used in the correct situation or with compatible plants.

American Beech (Fagus grandifolia), a native climax forest tree, is often found associated with Sugar Maple. It thrives in well-drained, fertile soil with a high water table (within two feet of the surface). *Fagus grandifolia* is found near lakes, ponds, flood plains, or slightly upland sites. This giant native reaches 50 to 70 feet in height in the landscape with some in the wild reaching 100 feet in height. American Beech, at maturity, has an oval habit in the forest, but when grown as a specimen, its lower branches are somewhat descending.

The foliage is a silver-green when in new growth, changing to a dark, rich green throughout the summer, with exciting fall color. The fall color can vary to yellow, orange, or brown on the same tree with brown predominating. The fall color is unique as many of the upper leaves fall off, giving the tree a "skirted" look to the lower portion. Further, the lower leaves remain on the tree for much of the winter, becoming a translucent pale brown, giving the plant a ghostlike appearance.

The clear gray bark is outstanding throughout the year, adding color and texture to the "woodsy" landscape. A group of old trees gives one the feeling of a herd of elephants.

American Beech is a sensitive native aristocrat. This plant should be used in natural park situations, not golf courses, the home landscape, or areas of active recreation. It is so sensitive that slight changes in grade (two to three inches), wounds (a lawn mower), or pruning will result in decline or death. American Beech can be pruned when young (cuts under one inch in diameter) during March or before dormancy breaks. Pruning at other times of the year or larger wounds often result in heartwood rot. This plant is a poor compartmentalizer. Insect problems are many, but rarely damage the tree, with the exception of borers. Borers are an indicator that the plant is no longer in good vigor and usually contribute to the death of the tree. Presently, cultivars of *Fagus grandifolia* haven't been developed. One desirable characteristic for a cultivar would be a plant that has isolated or compartmentalized wounds.

European Beech (*Fagus sylvatica*), although related to our aristocratic native, is more adaptible for the landscape and has many interesting cultivars. *Fagus sylvatica* is relatively easy to transplant and becomes established within a year. Ultimately, it attains 80 to 90 feet in height. The oval, mature habit is accented with dense branching to the ground. In fact, European Beech is so dense that grass is unable to grow underneath it. The lower branches, which add to its gracefulness, should be left on. The leaves of European Beech have a smooth margin as contrasted to the coarsely serrated margin of the American Beech. The leaf color is a bright green when new, becoming a rich dark green as summer progresses. Fall color is slow to develop or non-existent most years.

European Beech will tolerate shade, as does American Beech, but thrives in full sun. It can be used in large area landscapes, e.g. parks, institutional grounds, or estates, as a specimen tree. European Beech can be planted in rich, well-drained soil with a high water table, as with American Beech. In fact, if the water table isn't within two feet of the surface, one should consider supplemental irrigation. *Fagus sylvatica* can be pruned, but heartwood rot is still a problem. Wounds from lawn mowers or large limb pruning will close faster than *Fagus grandifolia*, but compartmentalization is still a problem. Optimally, pruning would be limited to early spring (March through dormancy break) on two-inch or smaller branches. Generally, European Beech can tolerate difficult environmental conditions more than the sensitive native American Beech.

'Fern-Leaf' European Beech (*Fagus sylvatica 'Asplenifolia'*) has a habit similar to European Beech, e.g. 90 feet in height, being a perfect oval. The deep-cut leaves give a fern-like or delicate feeling. This tree seldom needs pruning when grown as a specimen. It can be used effectively in parks, large estates, or institutional grounds. To add to its gracefulness and excitement, one should leave the lower branches clear to the ground. This reduces maintenance and the possibility of wounds.

Columnar European Beech (*Fagus s. 'Fastigiata'*) is a narrow, upright plant which is exciting when used in mass plantings or as a hedge. Its ultimate width is 20 to 25 feet with a height of 40 to 50 feet.

'Purple-Leaf' European Beech (*Fagus s. 'Atropunicea'*) is the most readily available cultivar. This tree's leaf is dark purple in early spring, becoming a rich, dark green in early summer, analogous to 'Schwedleri' Norway Maple. The rate of growth of this plant is 12 to 18 inches in height annually, after establishment.

Weeping European Beech (*Fagus s. 'Pendula'*) is one of the truly exciting pendulous trees. Staking is required until the tree reaches 60 to 80 feet in height. This tree, from the underside, looks like a spiraling ladder, ascending to the sky. From the outside, it is a mass of foliage, with pendulous branches - interesting in all seasons. It establishes slowly, growing six to eight inches annually in height. If there is an outstanding cultivar of European Beech, *Fagus s. 'Pendula'* is probably it.

Copper Leaf European Beech (*Fagus s. 'Riversii'*) holds its reddish foliage throughout the growing season. When its leaves first unfold, they are a vivid red, turning a deep purple early in the summer. This is the most exciting and easily transplanted cultivar of the copper or purple-leaf forms.

'Tricolor' European Beech (*Fagus s. 'Roseo-marginata'*) is a tree adapted to the Central

Continues on page 18

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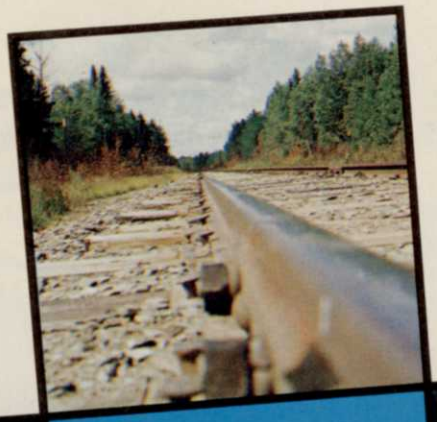
Beeches *from page 16*

Range of beech. It is dependably hardy as far north as Detroit, yet thrives further south, e.g. Cincinnati. The foliage is usually purple leaves with light pink surroundings and a white margin. This handsome specimen adds unique interest to formal or inner city park areas.

American Beech should be strictly limited to naturalistic areas where lawn mowers and/or pruning shears never touch its bark. American Beech is an exciting native tree which doesn't tolerate man and his manipulations of the landscape. European Beech and its cultivars are far more diverse and adaptable to the American landscape scene. European Beech transplants easier, establishes more rapidly, responds well to light pruning, and can be an exciting specimen plant when used in large landscapes, e.g. institutional grounds, parks, or golf courses. **WTT**

The outstanding cultivar of European Beech *Fagus sylvatica Pendula, (left) is interesting* in all seasons. However, it establishes slowly and must be staked until it reaches 60 to 80 feet in height.
Fern-Leaf European Beech *Fagus s. Asplenifolia* (below) seldom needs pruning and can be used effectively in parks, large estates, and institutional grounds.
Lower branches eliminate turf care underneath.



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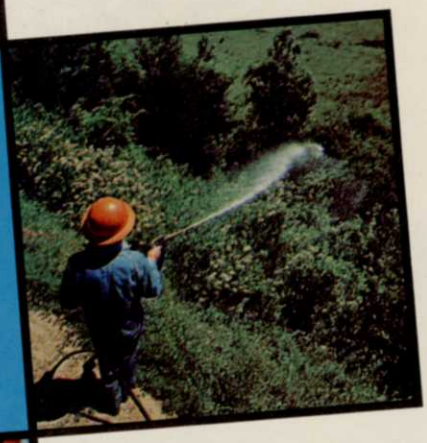

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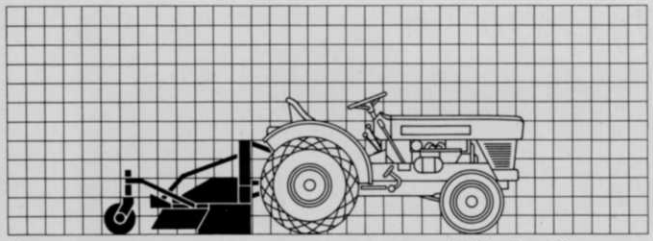

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SERVICING TRACTOR HYDRAULICS — SIMPLE YET VITAL TO OPERATION

By John Kerr, Assistant Editor

The hydraulics of your tractor provide the muscle for otherwise burdensome manual work. They assist you in many of the basic functions a tractor performs, such as braking and steering. With just a touch of a lever, you can lift, fold, and power attachments and implements weighing up to several thousand pounds. Hydraulics are the lifeblood of your tractor, yet they are very vulnerable to contamination and negligence. It is essential to maintain them.

There are two types of hydraulic systems on tractors: open-center and closed-center. Historically, tractor hydraulic systems have been open-center, in which the main pump produces a continuous flow of oil that must be returned to the reservoir when a hydraulic function is not in operation. Because the number of hydraulic functions increased so much— from power steering, power brakes, a three-point hitch, and independent remote cylinders to include control of power-shiftable transmissions, the PTO clutch, transmission clutch, and the differential lock—closed-center systems were introduced. In these, the pump contains standby pressure which is always maintained at a given specification. When a tractor demands more power, the pump kicks it out without using extra engine horsepower. Some manufacturers prefer one system over another for their equipment; some use both types.

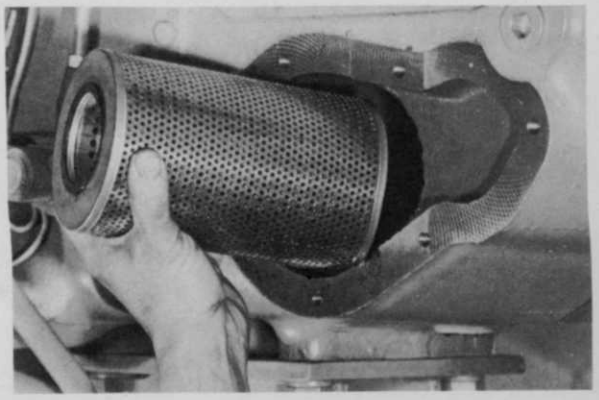
As tractors continue to increase in size and complexity, it becomes more and more important to keep the hydraulic system working well and free from breakdowns. The smallest particle of dirt, if it gets inside the system with its close-fitting parts, acts like an abrasive, scoring cylinder walls, destroying seals, and rapidly wearing the components. Maintenance of the system is very similar for older tractors with a separate hydraulic system and late models with a transmission-hydraulic system. Arlen D. Brown, associate professor of agricultural mechanics at Purdue University, lists 11 rules of maintenance that every owner or operator of a tractor should follow:

1. Change the hydraulic oil filter after the first 10 hours and first 100 hours in a new tractor.
2. Change the hydraulic oil filter at the recommended intervals after the first 100 hours of operation.
3. Check the hydraulic oil level periodically, at least every 200 hours, after the tractor is broken in.
4. Drain and refill the hydraulic system at the intervals recommended by the manufacturer.
5. Do everything possible to keep dust and dirt out of the system. Dirt is the worst enemy of the hydraulic system because of the damage it can do to pump parts and seals.
6. Take care to keep couplings clean when connecting remote cylinders.
7. Keep dust caps and dust plugs on all hydraulic cylinder couplings to help protect them from dirt and grit when couplings are disconnected.
8. Keep hydraulic oil containers absolutely clean, and use extreme care when adding oil or refilling so that no dirt can get into the system from around the filter cap, funnels, or from dust in the air.
9. Keep the hydraulic oil cooler clean to help prevent overheating of the hydraulic oil. If the hydraulic oil has been overheated, check with the tractor dealer. It may be advisable to drain and refill the system with new hydraulic oil and change the filter.
10. Operate the hydraulic units on the tractor correctly and carefully.
11. Always use the hydraulic oil recommended by the manufacturer. The wrong oil in the system can damage seals and lead to premature failure of parts of the hydraulic system.

Although tractor operators may be aware of many of these points or have read similar aids in their owner's manual, they are remiss in acting upon them. Manufacturers always stress hydraulic maintenance.

"Operators usually have problems because they let contamination get into the system," says Don Liller, assistant national service manager for Kubota Tractor Corp. "Only the large construction concerns that have been exposed to hydraulics for a long time and to whom the downtime is all important, only those types of individuals, pay close attention to the cleanliness of a system. The average operator around small grounds, nurseries, and those types of areas usually lets his tractor alone as long as everything is working OK. They don't bother doing any preventive maintenance."

"Changing filters, checking oil, and adding oil when necessary is extremely critical on hydraulic systems," says Don Borgman, supervisor of technical services at the John Deere Horicon Works. "We have a hell of a problem educating our customers that it is not something we tell them to sell more oil and filters; it's something we want them to do to give them better service out of their equipment. It's like anything else; if it's maintained



Filters should be replaced at recommended intervals. (Photo courtesy J I Case)

properly and not abused, it's going to last a long time."

Robert Snopko, product performance manager of the Agricultural Equipment Div., J I Case, tells owners: "Good hydraulic maintenance begins when you purchase the tractor. Your dealer will go over the system with you, pointing out special features. He will also explain what you as an owner must do to properly care for the system.

"Read your owner's manual thoroughly. In the manual, the manufacturer will give detailed instructions on taking care of the hydraulic system. Pay special attention to any instructions on servicing filters and any recommendations on the type of hydraulic oil to use.

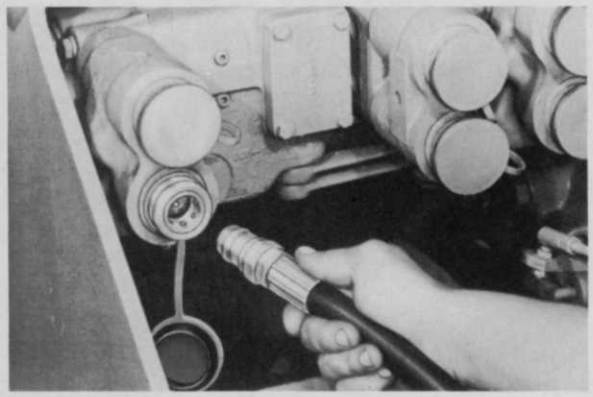
"The really smart operators write out their own check list of maintenance procedures. They keep this list taped inside the cab, where it serves as a constant reminder. Some manufacturers provide self-adhesive maintenance charts which can be fastened to the cab."

Tractor manufacturers agree that most hydraulic problems occur because of the use of wrong or contaminated hydraulic oil and unclean filters. It is important to use the oil recommended by the manufacturer. "Saving money by buying the cheapest oil and filters you can find may turn out to be a very expensive bargain," says Snopko.

The hydraulic oil must transmit power, lubricate all moving parts, protect the metal parts of the system from rust and corrosion, resist oxidation and foaming, and separate itself readily from air, water, and other contaminants. The oil must also be stable over a long period of time and maintain the proper viscosity through a wide range of temperatures.

In order to have all these properties, various additives are incorporated into the oil. These include viscosity index improver, an "extreme pressure" additive, oxidation inhibitor, rust and corrosion inhibitors, and foam inhibitors.

The additives in the hydraulic oil help hold contaminants in suspension and protect the system but will eventually lose their effectiveness after a certain period of time. The hydraulic oil must be drained while the contaminants are still in suspension and the additives are still protecting the system. The oil change interval recommended by the manufacturer indicates the maximum number of hours of operation that the hydraulic oil can be expected to maintain its ability to protect the system. This information and some of the following tips on changing oil and filters can be found in Arlen Brown's book, *Tractor and Small Engine Maintenance*.



Both coupling parts should be clean before attaching equipment to hydraulic system.

Recommendations vary some between makes of tractor, but the hydraulic oil should usually be drained at least once a year. The hours of operation will vary from 600 to 1,000 or 1,200 hours with different manufacturers. Regular drainage of the entire hydraulic system is extremely important to remove products of oxidation, such as acids and sludge, water which tends to accumulate in the system, minute metal particles, and other contaminants. Drain the system when the hydraulic oil is warm, and more of the contaminants will be removed.

If the drained oil has sediment and sludge in it, the hydraulic system should be flushed before refilling. Follow the manufacturer's recommendation carefully, or have this done at the dealer's service department. Probably the only safe flushing agent to use is the hydraulic oil regularly used in the system. Change the filter and fill the system with the recommended hydraulic oil and operate the equipment to cycle the oil through the system until the hydraulic equipment operates satisfactorily. This may take several hours. Drain the flushing oil, replace the filter or filters, and refill with the recommended hydraulic oil.

J I Case's Snopko suggests making frequent visual inspections of the hydraulic systems to anticipate dirty oil. "Some people argue that a small leak is not a serious problem because you are only losing fluid, which can be replaced," he says. "A leak, however, is also a possible source for contamination, because where fluid can get out, dirt and water can get in."

If the fluid appears milky, water has entered the system, says Snopko. This is time to drain and flush. It also helps to smell the oil. A burnt odor indicates the fluid has overheated, usually from an overbearing workload. "A dirty hydraulic oil cooler or a damaged line may also cause overheating," says Snopko. "Any implement or attachment mounted on your tractor must not block the flow of air around the cooler."

If, after all these checks of the hydraulic oil your equipment still does not operate correctly, there are probably gum and lacquer deposits present, and the system will have to be taken apart and cleaned manually. This should probably be done by the tractor dealer service department and certainly only by a qualified mechanic. Regular draining and servicing of the hydraulic system should reduce the formation of gum and lacquer.

A magnetic drain plug is ordinarily used in hydraulic systems. The plug collects small particles of metal and keeps them from circulating the system. The drain plug should be thoroughly cleaned before it is replaced.

Even with careful maintenance, contaminants can accumulate in the hydraulic system. The filter or filters remove them as the oil circulates but the filter must be changed before it has absorbed all the dirt and contaminants it can hold and stops working. Since the filter has a by-pass valve, according to John Deere's Borgman, once the filter becomes plugged, the oil does not go through it any more but continues circulating. "Then you have unfiltered oil going through the system and it gets

Tractors *from page 23*

abrasive and does damage," Borgman says. The filter should also be changed under abnormally dusty conditions or high temperature operation.

Kubota Tractor's Liller says the rules are simple for hydraulic maintenance. "The single most important thing is you have to keep it clean. That's really the name of the game on hydraulics." He suggests cleaning the all-cylinder rods and valve spools and all the exposed parts. Dirt wiper seals which keep dirt from getting in valves and components have to be periodically inspected to make sure they're resilient and conform to the shape they should be. That keeps dirt from entering the system.

"On any hydraulically-operated mechanical implement you have to keep all the pivot points lubricated," Liller says. "Every part is constantly lubricated and wear is negligible if you keep the dirt out." He warns about repairing hydraulic leaks in the field, which often end up contaminated and cause worse problems than you had.

Hydraulics were originally introduced to provide control of an integral implement. They now hook up on most tractors to operate mowers, tree trimmers, loaders, and a variety of different implements that mount on the front, rear or both ends of a tractor.

The primary means for driving implements is a power take-off (PTO) which is attached to the power train of the tractor. Another means is to mount a hydraulic pump on the PTO as a mechanical link with the power input from the PTO's rotating shaft. Depending on what operation you want performed determines whether you are better off with a hydraulic drive or a PTO drive for your implement.

The advantage of the PTO drive is that it is less expensive, provides a simple means of transfering large horsepower loads, and is easy to hook up. The hydraulic system works better around corners and when pulling implements far behind the tractor because there is no shaft to worry about supporting. Also, you do not have to bring the tractor to an equivalent rpm of the implement to drive it.

Practically all tractors are now manufactured with some arrangement for a "live" PTO—the ability to stop forward motion of the tractor without stopping the rotation of the PTO. This is very desirable and has led to much greater use of power take-off driven equipment.

New tractors, of moderate to large size, are equipped so that the new 1,000 rpm power take-off shaft may be installed. The new standard speed permits more efficient operation. The 1,000 rpm shaft has more, and smaller splines, than the standard 540 shaft. The tractors are designed so that the speed can be changed to correspond to the type of shaft being used. The power take-off standards are established by the American Society of Agricultural Engineers (ASAE) and the Society of Automotive Engineers (SAE), according to Brown.

He also says that on most tractors there is an adjustment for increasing or decreasing the speed of lifting or dropping implements. As a general rule, the heavier implements should be lifted more slowly to avoid undue strain on the system. Never overload the system. Most implements have auxiliary springs to assist in lifting. These should be adjusted to take as much load off the system as possible.

Because a tractor often is hooked up and then disconnected from implements, the hydraulic system is often exposed at these links. It is advisable to cap all connections securely when they are not in use. An uncovered connection collects dirt and when the component is then hooked up, the dirt is forced into the system.

"Be especially careful to avoid dropping or dragging hydraulic lines on the ground," says Snopko. "This damages the connections and greatly increases the risk of contamination."

"A lot of people do not wipe off the lines before they hook them back up," says Liller. "They might blow them a little or pass a rag over them. Once you start getting dust and dirt into the system, it's the beginning of the end. If a chronic problem, you can damage, even fail, the hydraulic pump. Scratched cylinders and failed pistons can really create some havoc. And it can get expensive. Hydraulic components are high priced."

The implements can be a good indicator of the condition of your hydraulic system. As Snopko says: "As you work with the tractor, watch the action of the hydraulic-powered implements. If their movement is slow or jerky, something is wrong with the hydraulic system. Stop working until you have determined and corrected the problem."

To make a smooth interchange of tractor and implements, one essential part of the hydraulic system is added, a remote cylinder. Interchangeability of cylinders between different makes of tractor and implement is accomplished by standardizing the stroke length and the cylinder mounted dimensions, according to John Deere. If the tractor is used with an implement or machine of another make, the tractor-matched cylinder can be readily installed on the competitive machine.

Remote cylinders may be single acting or double acting depending upon their construction and method of attachment, says Brown. It is usually best to attach the cylinder to the implement so that the heaviest load is on the cylinder when it is extending, because more piston surface is exposed to the hydraulic pressure. Stops are provided on the piston rod to adjust the length of stroke to the requirements of the implement. Clamp the stop securely so it does not work and damage the piston rod.

Today's hydraulic systems are very sophisticated. They have to be in order to meet the growing demands placed upon them. Your tractor, with its hydraulic system, provides a great deal of power and control.

Manufacturers are doing their part to provide the most efficient, up-to-date equipment for your particular operation. But once a tractor and implements become your tools for maintaining grounds, the responsibility, especially with the hydraulic system, is yours. **WTT**

You can purchase the book, *Tractor and Small Engine Maintenance*, by Arlen D. Brown from Harvest Book Publications, 9800 Detroit Ave., Cleveland, OH 44102. The price is $11 plus $1.25 for shipping.

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CONTROLLING SPRAY DRIFT THROUGH PROPER PESTICIDE APPLICATION

By S. W. Bingham, Professor of Plant Pathology and Physiology, Virginia Polytechnic and State University, Blacksburg, VA

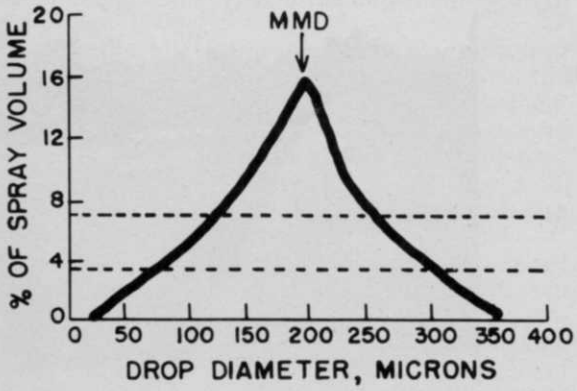
Spray drift, the movement of droplets to areas other than the intended site of application, causes many problems for the sprayer and his neighbor and is of utmost importance to control. In some cases, even a small amount of drift can be dangerous. It may damage sensitive crops nearby, produce unpleasant odors, and is generally undesirable in the environment. It also wastes chemicals too expensive to spread over non-target areas. To solve these problems and control drift, we must look at the size of spray droplets, a major factor.

On one hand, the size droplet containing a pesticide may be excessively small (less than 20 microns in diameter—a micron is 1/25,000 inch) and float in the air until evaporated. This pesticide may be carried high in the atmosphere and so widely dispersed that a concentration necessary to cause a response is never attained. The area adjacent to the pesticide application site may receive enough deposits from droplets of this size (or slightly larger) to be detected on sensitive species. On the other hand, droplets may be so large (greater than 1,000 microns) that they will only cover a percentage of the pests or site.

In general, insecticides and fungicides are applied using smaller droplets and sometimes larger spray volumes to obtain the desired coverage of the pest (droplet size around 70 microns). Herbicides appear more likely to show up in symptoms on adjacent areas and it becomes extremely important to utilize larger droplets (200 to 500 microns) with very low numbers of fine droplets in the spray application. The large heavier droplets fall from the spray boom more directly to the ground or plant surface while small droplets require long periods to fall and may float to greater distances in the air.

Spray droplets are generally smaller for insecticides or fungicides than for herbicides to obtain the desired coverage of the pest.

Three major means exist to produce the proper size droplet and control drift as well as possible during the application of pesticides. These are the equipment, chemicals, and environmental conditions.



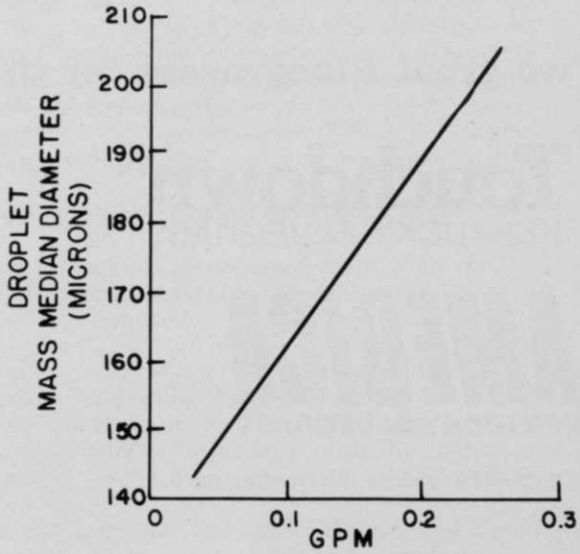


Figure 1. The typical nozzle orifice produces a wide range of droplet sizes. Overall, the spray is described by the mass median diameter, the top of the curve.

Figure 2. Mass median diameter increases as the flow rate is increased by changing to larger orifices and maintaining the same pressure. (Both graphs are modified from Tate and Janssen, 1966).

The largest droplet size that provides consistent control of the pest will be most practical for drift control. Use as large a nozzle orifice as possible and as low a pressure as consistent with spray pattern.

Equipment influences spray drift

The typical nozzle orifice on boom sprayers gives a wide range of droplet sizes and is a good place to begin seeing the effects equipment has on spray drift. Figure 1 shows the typical distribution from an orifice under 40 psi. In herbicide applications with drift hazard situations, a larger orifice size may be necessary to reduce the amount of fine droplets (less than 100 microns) below levels that may cause effect on non-target plants.

Since a wide range of droplet sizes comes out of a nozzle orifice, it is important to have a good way to express the amount of spray in various size droplets. If you double the diameter of a droplet, you must increase the volume of spray eight-fold to achieve the same amount of spray. For example, in figure 1, about 7 percent of the spray volume is in 130 micron diameter droplets and 7 percent in 260 micron droplets. Yet, at 130 microns there are eight times as many droplets as at 260 microns. In another comparison, 3½ percent of spray is in 75 micron droplets and the same amount is in 300 micron droplets. There are 64 times as many droplets having the small diameter. These are too small in most herbicide applications, even in still air. Then, the term used to describe the droplet distribution from various orifices frequently is "mass median diameter" (MMD), which refers to the diameter with ½ of the spray in droplets larger and ½ of the volume in droplets smaller. There may be many times more small droplets in comparison to large droplets.

The angle of spray pattern is also important to consider. Generally, cone and flat fan type orifices provide about the same droplet spectrum if the spray angles are about equal. At the same pressure, the flow rate increases with larger nozzle orifices (equal spray angle) and droplet size rate increases in almost direct proportions (Figure 2). A wide angle spray pattern (80 degrees) has more small droplets than narrow patterns (65 degrees). For example, at a 0.2 gallon per minute (GPM) flow rate using 40 psi, the MMD is about 380 microns for 80 degree flat fan nozzle orifice and about 450 microns for 65 degree flat fan (Figure 3) orifice. The operating pressure is regulated by a pressure regulator through returning excess spray back to the tank. If the operator uses larger nozzle orifices and reduces the pressure to obtain the same flow rate, the MMD is also increased. Figure 3 shows that reducing pressure to 10 psi provided a MMD of 490 microns compared to 380 microns using an 80 degree spray angle and 40 psi.

Assuming the boom has a fixed nozzle spacing or the flow rate per unit of boom length is to remain the same, an orifice providing a larger spray angle (80 degrees) would necessitate a low boom height (about 18 inches) compared to an orifice with narrow angle (65 degree) pattern (about 22 inches high). The importance of nozzle height and distance a droplet must travel to the target will be discussed under environmental effects later.

Since droplet size is a major factor in spray drift control, let us describe these related equipment aspects. First, the nozzle orifice size has a great impact on droplet size. Additional pressure, especially using a smaller orifice to provide a similar flow rate, will result in larger numbers of small droplets. As the spray angle from the orifice becomes larger at a given flow rate, it will produce more small droplets.

The speed of the sprayer and the orientation of the nozzle orifice to the direction of travel will also have an impact on droplet size. If the nozzle is spraying in the direction of travel, the droplets will be small. When spraying perpendicular to travel direction, a median droplet size is obtained. And spraying backward from the travel direction, with all other conditions the same, results in the largest droplets.

Some developments in nozzle design have greatly improved drift control. Nozzles are designed to reduce the number of small droplets in the spray pattern. The nozzles utilize a core and disc for swirling and metering the spray passing through the system. The secondary swirl chamber in the nozzle cap alters the flow of liquid, resulting in few fine droplets being discharged from a secondary large orifice in the cap. This is further improved by a special passageway extending from this orifice in the nozzle cap. Thus, nozzle design has been improved to reduce the range of droplet sizes and effectively reduce the number of fine droplets delivered from the boom.

Continues on page 28

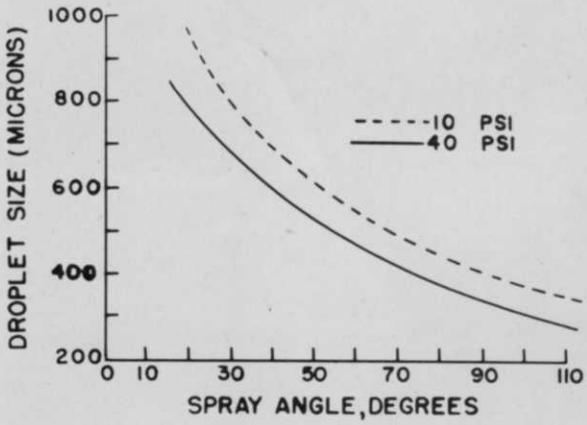


Figure 3. Droplet size gets smaller as the spray angle increases. Lower pressure provides larger size droplets. (Modified from Spraying Systems Co., 1967)

Hooded sprayers are available for many types of pesticide application; for example, herbicides to turfgrass areas. In this case, the hood contains somewhat rigid flaps hinging from about 10 inches above the soil level to provide cover rubbing along the top of the turfgrass. Gauge wheels maintain the hood and boom under the hood at a uniform height. These sprayers are generally mounted on a three-point hitch and are raised for turning (stop spray during turning because drift occurs from lifting hood).

Wick applicators are designed to apply pesticide through ropes rubbing on the plants (Figure 4). The rope is usually mounted through holes in the boom containing the spray material and trails along the bottom of the boom. Droplets are not formed until on the plant surfaces. Therefore, spray drift is almost completely controlled. This type of applicator is used primarily for weeds that are taller than the crop or desirable plants.

There is also a recirculating sprayer which utilizes streams of spray material directed from nozzles on one side of a row to trap on the other side. Weeds must be taller than the crop for effective coverage with less pesticide on the crop. There are very few fine droplets from this application except when the stream of spray splatters as it hits the target plants.

With equipment, it is important to remember that droplet size and distance from droplet release to target are prime factors in drift control. Nozzle orifice size and pressure utilized are also essential. Less spray drift comes from a large orifice, low pressure boom sprayers, and low boom height. Operators should utilize the largest droplet size that will provide the desired control of the pest in order to reduce spray drift.

Chemical aspects influencing spray drift

A pesticide formulation contains many ingredients to improve the final application results. Surfactants, emulsifying agents, and other additives affect the droplet size during application. Any change toward larger droplets usually reduces drift potential. Generally, formulation ingredients increase viscosity of the spray and increase droplet size during application.

During the last several years, thickeners have been widely evaluated and used in reducing spray drift during pesticide application. One thickening agent is a polyvinyl polymer material which provides some increase in mass median diameter of the spray droplets during application, but the major improvement lies in the fact that it effectively reduces the number of small droplets through elastic surface properties (Figures 5 and 6). The addition of anti-drift thickeners provides a greater margin of safety from spray drift; however, acceptable results must be attainable with slightly larger droplets. These compounds are particularly suited for drift control while applying auxin-type herbicides.

Even with polyvinyl polymers included in the spray mix to reduce the chances for significant spray drift, drift can still occur. Then, it continues to be important to use common sense in regard to pesticides that are particularly proned to produce bad effects or residues on nearby sensitive plants.

Droplets as large as 200 microns drifted 15 feet or more in a 7½ mph wind while falling 7½ feet from a nozzle tip in a wind tunnel (Figure 5). Using 1 pint of Nalco-Trol (polyvinyl polymer from Nalco Chemical Co.) per 100 gallons of water reduced drift to barely detectable levels using a dye to determine droplet deposits on glossy paper at 5 feet down wind under similar conditions.

In addition to drift control, the polyvinyl polymer formulations provide spreading properties on the leaf surface and improve uptake of several herbicides. Thus, herbicide effectiveness may be improved by keeping the droplet on the foliage, spreading, and improving absorption for longer periods (droplets dry on leaf surface much slower).

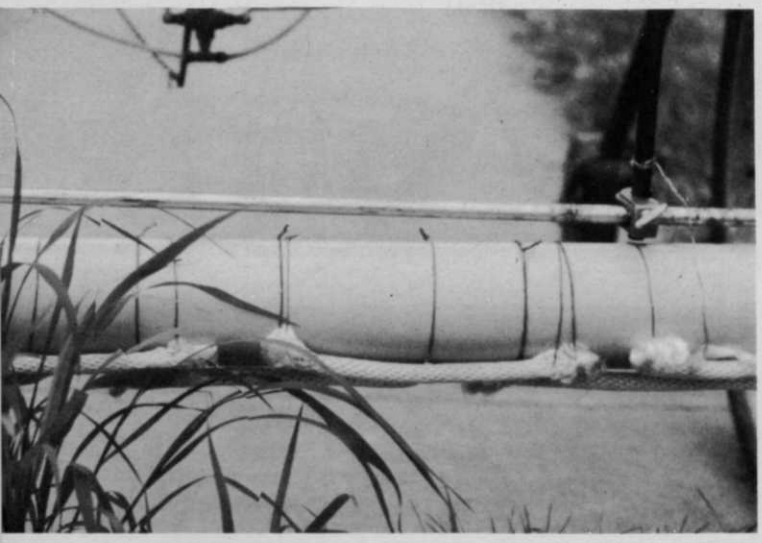


Figure 4. Wick applicator boom showing rope which applies the herbicide to weeds that are taller than the crop.

Environmental conditions influence spray drift

Wind speed is usually considered the major factor in drift of spray. For water spray solutions, droplets of 100 micron diameter will fall about 1 foot per second and in a 3 mph breeze will drift about 40 feet in a second. A droplet of 500 micron diameter will fall 1 foot in 0.15 seconds and drift less than 1 foot during this time in a 3 mph breeze. Even in a 15 mph wind, these large droplets will drift only about 3 feet while falling 1 foot. Wind significantly reduces the number of days to spray herbicides in the spring because of drift problems.

Temperature and humidity are also factors in drift control. Evaporation of spray droplets presents some problem when they are released several feet from the target surface. During warm weather, considerable drying down of droplets occurs and rising heat currents may become buoyant to the spray. Evaporation of the droplet eventually will give rise to particulate (wettable powder or salt crystal) pesticide which is readily carried through the atmosphere for periods of two or three days. Spray droplets evaporate during fall under

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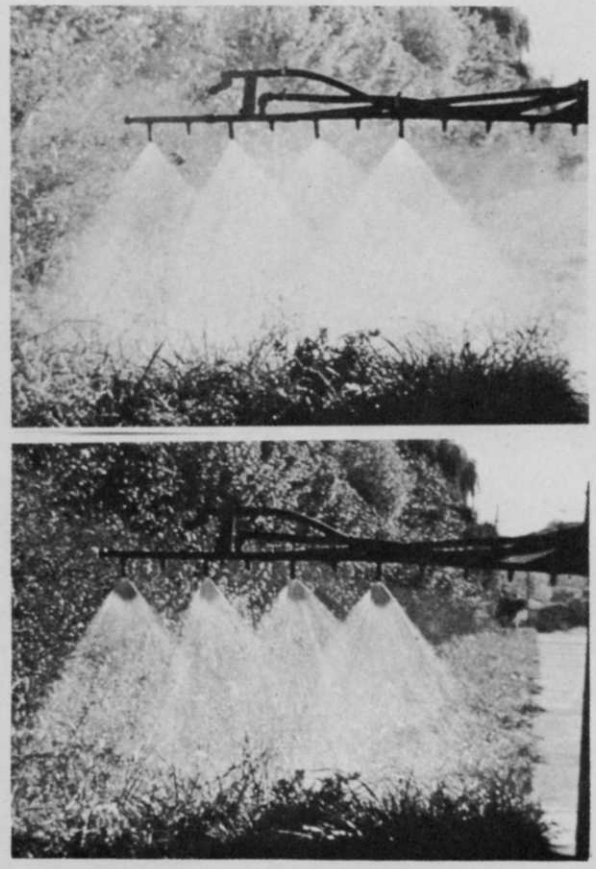
Drift *from page 28*

low humidity conditions and rate of fall will slow as size becomes small (Figure 7). The small spray droplets evaporate fast because of large surface area per unit volume and so the rate of evaporation increases during fall to the target.

For evaporation to occur, the water molecules must migrate away from a droplet and heat toward the droplet. Thus, the largest droplet size that provides consistent control of the pest will be most practical for drift control. As mentioned earlier, small droplets are quite effective for insect applications and in large droplets require more of the pesticide which increases environmental contamination. In general, herbicides are applied to the leaf and are retained until translocation to other plant parts. Not until spray volume becomes extremely low (less than 5 gallons per acre) does one find decreasing droplet size below 100 microns improve herbicidal effectiveness using foliarly applied compounds. Exceptions may include compounds which are very poorly absorbed and translocated by the plant.

Thickening agents added to pesticides increase the diameter of spray droplets and decrease the amount of drift. Added to this sprayer, a polyvinyl polymer material also provides good spread and better absorption by leaves.



An inversion condition with stagnate layers is conducive to cloud formation from fine spray in the relatively cool air near the ground and eventually may fall on sensitive crops a distance away, producing detectable symptoms. The opposite may also occur—relatively warm air near the ground is conducive to rising convections which carry fine droplets high in the atmosphere and they become so disperse that detectable or symptomatic conditions must include wind, temperature, humidity, and conditions involving layers of warm and cool air.

Environmental, chemical, and equipment aspects

Since most of the factors in drift control centers around droplet size, we might summarize this discussion by saying that we should use the largest droplets that are consistent with the desirable level of pest control. Remember, insects and diseases may require small droplets, which are likely to drift to non-target areas during application. Herbicides present the greater problem since small residues on non-target plants yield as well as produce unwanted residues. However, larger droplets are notably effective with herbicides and drift control is quite possible.

We would, then, use as large a nozzle orifice as possible and as low a pressure as consistent with spray pattern to provide drift control and best control. Reducing the distance droplets must travel reduces the distance wind will carry droplets off target and the time for droplets to dry to smaller size. Drift control chemical agents can be added to the spray mix to reduce the fine droplets in the application. Applications during morning hours or later afternoons affect drying of small droplets. Avoid windy weather for maximum drift control. Even when all other factors are being considered, wind will still carry spray to some extent (drift is never completely controlled). Layers of warm and cool air can cause unwanted movement of pesticide fine droplets a long distance. As you can see, common sense is a major factor in drift control.

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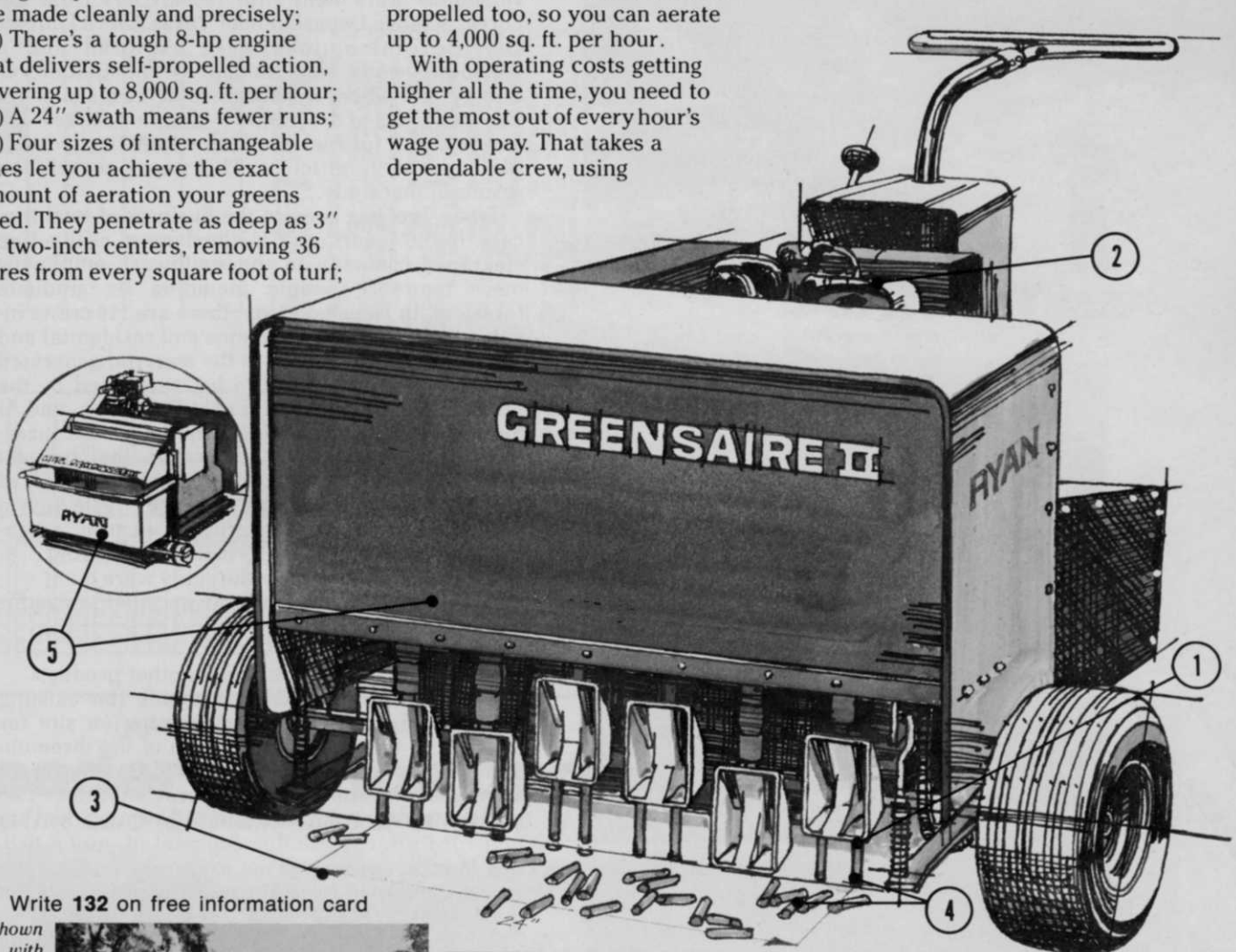

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TEXAS FORESTERS STUDY SAVINGS OF UTILITY CLEARANCE RESIDUES

By W.K. Murphey, J.G. Massey, and A. Sumrall, Professor, Assistant Professor, and Forester, Texas A&M University

Large stumps and branches as well as chips made in the field are rechipped to achieve the right size particle for energy use.

The rising cost of energy has prompted a Houston-based utility line clearance corporation to join with Forest Department staff at Texas A & M University to evaluate disposal methods for tons of wood chips it produces daily.

Trees, Inc. had been disposing of the residues from its power line clearance and maintenance in a landfill that it owned and operated. As this landfill became filled the company searched for alternatives to dumping the approximately 113 tons of residues to be disposed of daily. To this end, conversations were held with researchers from the Forest Science Department of Texas A & M University. Several options were explored and a feasibility study was funded by the Center for Energy and Mineral Resources at Texas A & M. The study was to determine if chipping the residue and selling it for fuel was both economically feasible and energy efficient. This paper reports the results of that study.

Trees, Inc. has been in the business of total tree care for 27 years and is the largest utility line clearance company in the southwest, employing more than 650 people including six graduate foresters. In Houston alone, there are 110 crews involved in utility line clearance and residential and commercial tree work. It is the material generated by these crews that was to be considered by the project. C. L. Benge, president of Trees, Inc., and Al Sumrall, forester, were instrumental in encouraging and developing the innovation that brought about this study and the successful completion of turning thousands of tons of wood waste into a marketable product. The product, in turn, potentially saved gallons of oil formerly used as fuel.

The options explored in the study were to:

1.) Chip all of the residue to an acceptable size for use as a fuel chip.

2.) Continue to landfill.

3.) Explore use of this residue for other products.

The data was collected assuming the existing landfill site would be the concentration site for material to be processed for each of the three options. These data, shown in Table 1, represent averages obtained over several months. The mileage rates to the new landfill represented initial runs prior to the development of option two. The landfill option was not exercised, nor was the search continued for other possible products from the residue.

The costs of material in dollars includes the money expended in wages, fuel and equipment pro-rated to one day. Approximately 113 tons of green wood are delivered to the concentration site each day by crews working throughout the city. There is energy expended to cut, chip and deliver that wood residue plus the energy represented by the wood itself. This energy is assumed to be 4,000 Btu's per pound of green wood. The money obtained by the contract operation was not considered since regardless of option these funds

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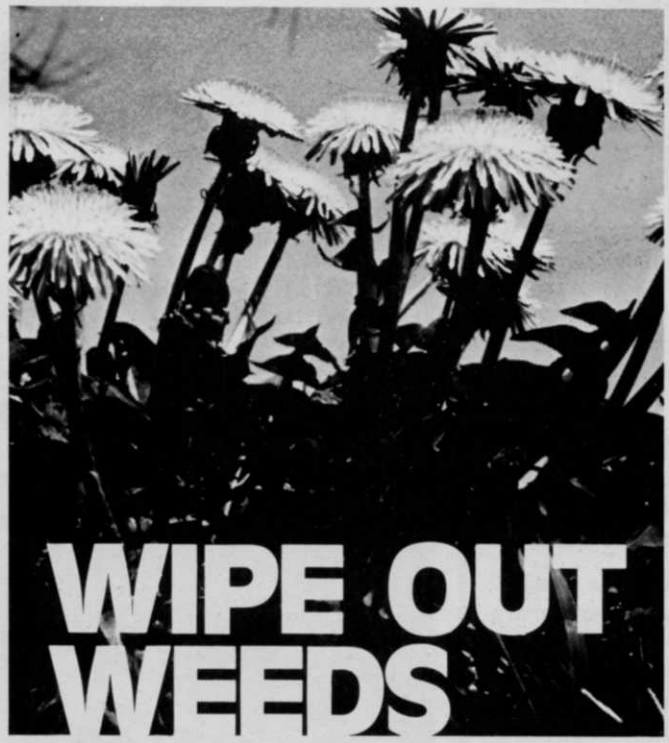

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Residues *from page 32*

would be the same. The calculation of the funds expended to remove the material to the concentration site was considered only to provide a base cost per unit of energy. The dollars include the labor, fuel, and equipment costs while the energy is that expended in cutting, running mobile chipper and transporting residue to the chipping-concentration site.

The additional dollars and energy expended in the landfill includes that associated with a 20 mile haul in 20 ton trucks, plus the fee for dumping. The total lost energy amounts to 925 million Btu's if we include the energy expended each day, plus that energy potential being buried. This energy is recovered minus that expended when the residue is rechipped for the fuel chip. The rechipping is necessary because logs and some other vegetation are not chipped at the mobile site. The cost of the chipper is recovered as shown by the total dollars expended in the landfill operation, $12,475, versus the fuel chip operation, $12,448.

Of interest is the value of this energy recovered. A barrel of residual fuel oil contains 6.286 million Btu's for a 42 gallon barrel. The fuel chip operation then produced the equivalent of 138 barrels of oil a day. The firing efficiencies of oil versus wood depends on the moisture content of the wood, but may average about a ratio of 1.25 in favor of oil. Hence, when firing efficiencies are accounted for we have an equivalent of 110 barrels of oil per day. As the cost of oil increases, the landfilling of wood residues becomes less and less attractive from a national energy perspective in addition to the costs of the landfilling operation.

The Trees, Inc., operation will be monitored further and as additional information becomes available we shall update this report. **WTT**

Table 1. Costs in Dollars & Energy per Day for Two Options of Residue Disposal

Material Costs — Concentration Site			
Dollars	$12,064.00		
Energy (mm Btu)	15.386[a]		
Material Costs — Landfill Operation			Total
Dollars	$ 411.21		$12,475.21
Expended Energy (mm Btu)	6.208[b]		21.594
Buried Energy (mm Btu)			904.0[c]
Material Costs — Fuel Chip Operation			
Dollars	284.00[d]		
Expended Energy (mm Btu)			35.893
Recovered Energy			868.107[e]

(a) Includes transportation 69,450 Btu/ton, Mobile Chippers 51,250 Btu/ton and chain saws 15.800 Btu/ton.
(b) Energy expended: Transportation 4.618 mm Btu/day and handling 1.590 mm Btu/day.
(c) 4000 Btu/lb x 2000 lb/ton x 113 ton/day = Btu's/day.
(d) Includes: Costs of handling, chipper operation and depreciation minus price for chips sold @ $1.25 per ton FOB site.
(e) Recovered Energy = Total energy from chips minus the energy expended from residue generation, transportation, handling and chipping.

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NORTHERN THEME PARK PLANTINGS REQUIRE COMPLETE IRRIGATION SYSTEM

Marriott's $50 million Great America family entertainment center near Chicago, Illinois is one of the world's most dazzling theme parks. Its five theme locales are jam-packed with daring thrill rides, live shows and colorful eating spots.

Today the park features lush green parkways, beautiful flower beds filled with exotic plantings and handsome wooded slopes. But the landscape wasn't always as colorful and thriving. In 1976, just two months after the park had been officially opened, the management of the vast entertainment center had to come to grips with a landscaping problem that was detracting from the beauty of the park and that was costing a considerable amount of money. There was no effective permanent irrigation system.

Complete irrigation systems are not considered necessary in the Midwest because of the usually abundant rainfall and are not usually a part of the total plan for an amusement park or other complex. Secondly, the Great America center is open only through the summertime, causing an expensive irrigation system to sit dormant through the cold months when the park is closed and the ground frozen.

Unfortunately, that rationale didn't take into consideration the intense heat of Illinois summers or the fact that park gardeners had selected flowers and other exotic plantings that required special watering care. The results: many of the plants died. These losses occurred despite the fact that maintenance people were watering the grounds as regularly as possible with a quick coupler valve system put in primarily to wash down streets and sidewalks.

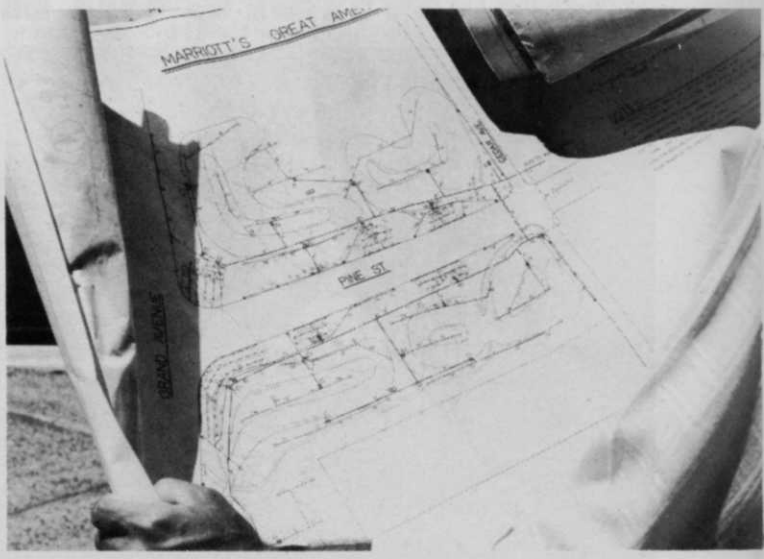
Faced with these losses, the park management sought irrigation help. In August of that first season, Century Rain Aid of Southfield, Mich. was asked to plan an irrigation system to water the front entrance of the park, one of the areas most affected by lack of proper watering. While undertaking that project, the firm met with park officials and were eventually asked to design the overall irrigation system that is under construction today.

"Our first problem was to provide the proper irrigation for the park's front entrance," said Ken Hodas, design manager for Century. "The grass was dying and detracting from the beauty of the park."

Hodas developed plans for the entrance watering system that included bringing in a line from the pump house. The project went smoothly and was completed very satisfactorily.

Once the front entrance was completed, Century Rain Aid was given the go-ahead to design a system which would allow for the many variables the 80-acre park's watering needs presented. That assignment called for the solution of several basic irrigation problems.

"Our fist step was to develop an overview of the project," said Hodas. "We had to ask ourselves several basic questions and build on the answers we got back. What kinds of plants are we watering? What moisture requirements must we meet? What present equipment and facilities do we have to work with? How long do we have to do the watering? What other variables are there?"



Plans for flower bed irrigation with approximately 50 head locations and proper spray overlap.

Great America displays some of the most exotic and unusual outdoor plants imaginable. Landscapers may decide, for example, to plant 5,000 tropical ferns in one given area, then pull them up the next year and transplant them in another area of the park. For that reason, Hodas had to take into account the fact that watering requirements would change from season to season as the plants were varied.

"To compensate for the flat Illinois landscape, a number of banked flower beds and berms had been put in," said Hodas. "These were steeply graded and bristled with pine trees. The park's professional caliber greenhouses kept the exotic plantings in ample supply, but the cost was tremendous money that could be saved with proper irrigation outdoors."

Therefore, irrigation recommendations were required in terms of planting areas rather than for specific greenery.

"There was a lot more to the project than just irrigating 80 acres of land," said Hodas. Their existing main line and pumping policy had to be altered to take into consideration the planting changes occurring almost yearly."

To get a handle on the exacting water requirements needed to irrigate the varying plants, Hodas relied on aerial photography and about 250 Polaroid snapshots. Additionally, the park supplied the Century Rain Aid team with a set of plans for the amusement park. Hodas assembled this

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Aerial photographs like this were used to pinpoint the location of sprinklers.

Irrigation *from page 36*

blueprint jigsaw thirty-six 24- by 36-inch sheets. Additionally, Hodas and his assistants walked through the park at least three times in order to spot locate the many sprinklers and valves that would be required.

To determine just how much water was available to do the job, the irrigation specialists called on the park's maintenance people.

"We started our planning with a figure of 1,500 gallons of water per minute," said Hodas. "But maintenance teams were also cutting into that figure at a rate of about 200 gallons per minute to wash down walkways and perform other watering duties."

Subtracting that figure allowed 1,300 gallons per minute to do the job. Additionally, park restrictions prohibited irrigating during visiting hours. With park hours from 10:00 a.m. through 10:00 p.m. throughout the summer season, plus other timing considerations, eight hours per day were left to irrigate the park.

Because of the high level of traffic through the park, including thousands of children, the sprinklers were located away from the walkways where they might be kicked or damaged.

Rain Bird equipment was used on the job, including Model RC-1260 Controllers, specially adapted for moisture sensing and lighted for nighttime observation and electric valves.

"As a part of our plan, we gave the Marriott people some figures for proper maintenance," said Hodas. Towards this end, we tried to limit our use of different models of sprinklers to a select few. In that way, we could keep our equipment standardized with backup quantities should replacements be needed."

The plan was delivered to the Mariott corporate offices in Washington, D.C. in the summer of 1977, six weeks after Century Rain Aid was asked to plan the project.

"We realized we were talking about a big expenditure even for a company of Marriott's caliber," said Hodas. "Savings in maintenance costs alone would not be cut drastically upfront. But, we emphasized that the savings in plantings would be considerable." Marriott okayed the plan and work was ready to begin.

The first phase of development involved approximately 65 acres. Contractors used more than 40 controllers as well as more than 300 electric valves and miles of pipes and wires.

What can irrigation designers learn from this project?

"Like a mathematician, you have to consider the problem step by step," said Hodas. "Be aware of all the variables you're going to face — the climate, the landscape, the variety of plants, available water sources, and so on. With those answers in hand, your previous experience can come into play. Certain sprinklers will work better than others depending upon the situation you're presented with. And costs are another important factor; you'll want to budget your efforts to stay within a realistic framework given the size of the project."

How does Hodas feel about the Marriott project?

"I'm very pleased with the plans we eventually drew up," he said. "If we had it to do over again, though, we'd prefer to be involved from scratch. We would have preferred to design the system as part of the overall project, before the park was open to the public."

What about the reaction of the visitors? Unfortunately, irrigation systems go largely unnoticed when working properly. Mothers may notice how beautiful the flowers look. Fathers will probably appreciate the shade trees. The kids? Well, they're there just for the fun. But few visitors will stop to think of the energy expended to make it all happen.

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There's a good reason why Cushman has been around for such a long time: We build equipment that lasts a long time.

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Built for keeps.

The Front Line's 72″ mower deck is made of 12-gauge carbon steel, reinforced and arc welded. It has a multi-disc PTO clutch, direct drive to the deck gear box with a sealed and lubricated shaft drive. The hydrostatic transmission is driven by two continuously engaged "A" section belts with self-adjusting tension.

There's no need to worry about overloading the Front Line's engine. The combination of our high torque engine and specially designed mower deck allows you to mow tall weeds and fine grass.

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The Front Line's cut in fine grass is so smooth, you won't believe it was made with three separate blades. That's because the blades overlap 1½″ to reach every inch of grass in the full 72″ swath. Also, the cutting height is adjustable to eight positions, from 1″ to 4½″ in half-inch increments.

Operating the Front Line couldn't be easier. With individual front wheel brakes, and wheel-type steering controlling a single rear wheel, you get tight maneuverability and better control on varying terrain.

The Front Line's mower deck makes your job easier, too. It extends more than a foot to one side, so you can trim right up to fences or trees. And it lifts hydraulically for transport over curbs. What's more, a large capacity fuel tank lets you work up to 6 hours between refills.

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OUTLINE TO EFFECTIVENESS AS A GREEN INDUSTRY SUPERVISOR

By James F. Gauss, Horticultural Consultant, Evanston, IL

In the past eight years, I have had the opportunity to supervise four different groupings of people. These groupings ranged from five to fifty people; professional and non-professional; volunteer and paid staff; trained and untrained. I am also the "supervisor" of a family of seven. During this time I have learned and continue to learn much about my role as a supervisor and leader. What I have learned I will share with you in a simple outline format.

In planning

1. Have a calendar marked with known work projects for the season or year. Both you and your staff should keep such a calendar.
2. Write out a general work plan for each week for yourself and your staff.
3. Have a written daily work plan with specific projects and personnel responsible along with a designated supervisor.
4. Whenever possible, give specific written instructions for each new task and equipment and/or tool needs, to the worker in charge.
5. Schedule vehicle and equipment needs in advance with those responsible for such.
6. Make your expectations of completion time for each task well known.
7. Be able to discern each worker's abilities and achievements and give them tasks matching their abilities where they are likely to succeed. Work from employee's strengths, not weaknesses.
8. Define your goals and objectives early. Start with realistically achievable objectives with matching personnel.
9. Consult others periodically in planning work schedules, assessment of procedures, personnel, and accomplishments.

In Task Mastering

1. Give clear, precise instructions. Who? What? Where? How? When? Who is to do the job? Who is in charge? What, specifically, do you want done? Where is the job located? Where do you want things or personnel to go? How, specifically, is the task to be done? When do you want the job started and finished?
2. Be understanding of the need for work slowdowns. For example, during a particularly hot day or after a hard task, you might expect lower productivity. This can be turned into a reward system by mentally lowering your standards of productivity temporarily, by telling employees that they can take it easy on this task since they worked exceptionally hard on the last one, or by designating easier tasks or lengthening the required time for completion of the task. This can be viewed as an exchange for work speed-ups and high levels of productivity during peak needs. This is a better alternative to undirected slow-downs initiated by the workers which would put them in control of the situation, foster insubordination and poor work habits.
3. Continually assess your own role, goals, effectiveness, and progress.
4. Be willing to back up and change an approach to a task when something is not working out.
5. Never belittle, embarrass, or holler at an employee, and especially not in front of other workers. Rather, take the employee aside and specifically point our your expectations of him in that situation where he is falling short and how he can meet your expectations. If a worker tries hard to meet your expectations but falls short because of skill deficiencies, then try to channel his efforts into learning the task or an area of work more appropriately matching his present abilities. If a worker is unwilling to meet your expectations when they are just, then the consequences of his unwillingness should be clearly made known to him.
6. Accept different ways and approaches to getting a job done. For the most part, be understanding and tolerant of an atypical work performance which does not influence the work of others, inhibit a task from completion, or violate safety rules, and does not reflect unfavorably upon the organization. Praise behavior and performance you want to continue.
7. Motivate workers through positive feedback and tangible rewards (a thank-you note, buying coffee, public recognition of appreciation or achievement, etc.).

In Delegating Authority

1. Make your delegation of subordinate authority clearly known to that person and those he will be supervising and the area of his responsibility. Keep your subordinate leadership well defined and consistent wherever and whenever possible.

In Problem Prevention and Solving

1. Make your expectations for each employee clearly known to that employee.
2. Nip all complaints in the bud—be willing to admit mistakes you've made and apologize for things you did which cause fellow workers consternation or adversely affect worker morale. Promote reconciliation in worker disputes.
3. Let no complaint go unanswered. However, avoid debates over the rightness of your decision if you have appropriately weighed all approaches and consequences. Whenever appropriate, satisfy a worker's genuine desire to know the importance of his task and why he's doing it this way.
4. Deal with employee problems promptly and decisively. Bring in additional people when necessary and appropriate, especially supportive people, such as your supervisor, and the other persons in question.

Continues on page D

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Cellin fiber mulch provides a thermal barrier that minimizes variances in ground temperatures. This helps assure germination.

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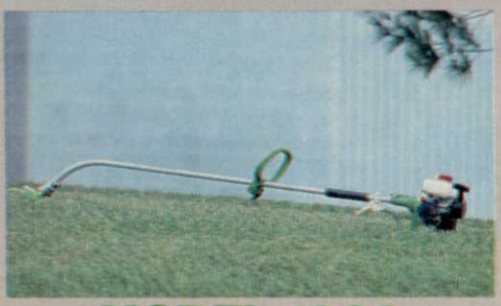


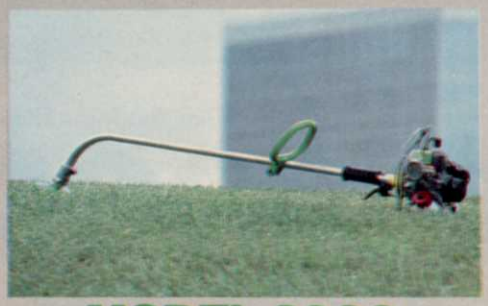
MODEL 1900
High-quality economy trimmer.

Here is famous Green Machine quality and performance built into a new, low-priced 14.9 cc gas-trimmer. Unlike many low-end gas trimmers, The Green Machine Model 1900 has plenty of power—so much power that it comes equipped with two heavy-gauge long-wearing .080 Green Line cutting strings.

Coupled with great engine performance is a simple but effective 2-string, manual-feed cutting head. A TFC™ automatic-feed head is available as an option, as well as a new flexible rubber blade for fast trimming of weeds. Other features of the 1900 include a flexible, enclosed drive shaft, light overall weight for ease of operation, multi-position molded handle.

SPECIFICATIONS:

Engine Type: Inverted 2 Cycle Air Cooled **Cylinder Type:** Single Alum. Alloy Chrome Plated **Displacement:** 14.9 cc **Bore & Stroke mm** 27 x 26 **Compression Ratio:** 6.2:1 **Max H.P. (H.P/RPM)** .65/6500 **Carburetor:** Butterfly Type All Position **Ignition:** Contact Point Type **Clutch Housing:** Direct Coupled **Lubrication (Fuel Mixture)** 20 to 1 **Fuel Capacity:** (.4L) 42Qt. **Shaft:** Flex Type **Reduction:** None **Cutting Head (Std):** 5" Dia. **Cutting Swath:** 17 in. **Weight (with cutting head)** 10 lbs (4.5kg)

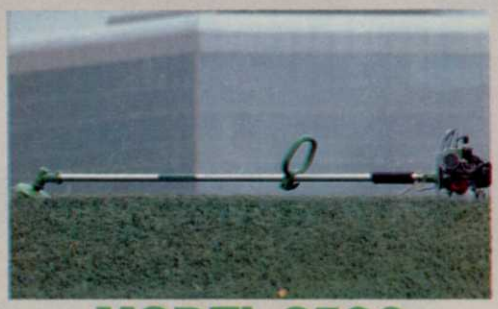


MODEL 2000
Loaded with Power.

This model is equipped with the popular 22.5 cc Green Machine engine. There's power to spare for the toughest string trimming operations. Standard equipment includes the reliable, manual-feed head. You can also use it with the optional TFC™ Tap-For-Cord head. A light tap on the ground automatically releases fresh cutting string. The Model 2000 can also be used with the new fixed-line head (.105 line). Other features include an all-position diaphragm-type carburetor with positive fuel shut-off. Power is transmitted through a rugged, enclosed flexible drive-shaft. As with the 1900, the mid-handle is easily adjustable to the operators height and can be quickly reversed when the unit is used for edging. It's a beautifully built unit, ideal for those that want additional power and efficiency.

SPECIFICATIONS:

Engine Type: Upright 2-Cycle Air Cooled **Cylinder Type:** Single Alum. Alloy Chrome Plated **Displacement:** 22.5 **Bore & Stroke mm:** 32 x 28 **Compression Ratio:** 6.5:1 **Max H.P. (H.P/RPM)** 1.2/6500 **Carburetor:** Slide Type All Position **Ignition:** Contact Point Type **Clutch Housing:** Direct Coupled **Lubrication (Fuel Mixture)** 20 to 1 **Fuel Capacity:** (.6L) .64Qt. **Muffler:** Spark Arrestor **Shaft:** Flex Type **Reduction:** None **Cutting Head (Std)** 5" Dia. **Cutting Swath:** 18 in. **Weight (with cutting head):** 11 lbs (5kg)



MODEL 2500
A great string trimmer—and more.

Powered by the proven 22.5 cc engine, here is a string trimmer—that's more than a string trimmer. Model 2500 comes equipped with a new Universal TFC™ head for fast, efficient grass and weed trimming. Just switch to one of the optional quick-change metal blades and you've got a great brush cutter or tree pruner. The performance of this unit in tough brush and pruning operations has to be seen to be fully appreciated. The brush blade lets you cut through heavy brush and vines up to ¾ inch in diameter. The saw blade, used with a combination chopping/sawing action can slice easily through branches up to three inches in diameter. It is equipped with a straight solid-steel shaft with spiral-bevel gears. Four optional heads are available for this unit—see chart on back page.

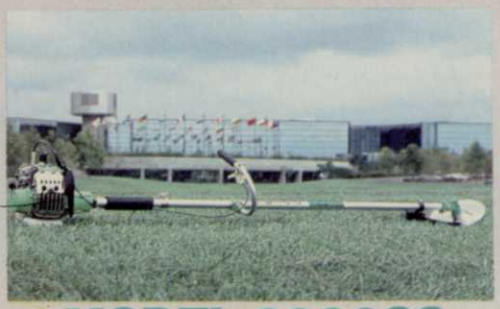
SPECIFICATIONS:

Engine Type: Upright 2-Cycle Air Cooled **Cylinder Type:** Single Alum. Alloy Chrome Plated **Displacement:** 22.5 **Bore & Stroke mm:** 32 x 28 **Compression Ratio:** 6.5:1 **Max H.P. (H.P/RPM)** 1.2/6500 **Carburetor:** Slide Type All Position **Ignition:** Contact Point Type **Clutch Housing:** Direct Coupled **Lubrication (Fuel Mixture)** 20 to 1 **Fuel Capacity:** (.6L) .64Qt. **Muffler:** Spark Arrestor **Shaft:** Solid type 8mm **Reduction:** 1.26 Gear Drive **Cutting Head (Std)** 5" Dia. Universal TFC **Cutting Swath:** 18 in. **Weight (with cutting head):** 13 lbs (5.9kg)

★ **Blades and blade guards shown in top photo are optional items**
★ **Fuel mixture ratios shown in specifications are with conventional 2-cycle oils. For convenience and long engine life we recommend ONE-MIX™, the great new multi-ratio oil**

een Machine®

Commercial-quality TFC™ Tap-For-Cord head equipped with Green Line extra long-life nylon string. (Model 3000SS, as well as 2500, 4000, and 4500, also accept metal blades for brush cutting and tree pruning.)



MODEL 3000SS

The Pro's Choice.

This Green Machine has set the standard for commercial-quality trimmers. Thousands are in use by professional gardeners, grounds maintenace crews, and large-acreage owners. The 3000SS has been made even better with a new, more powerful engine and solid-state ignition. Like the 2500, these units can also be used for brush cutting and tree pruning, using the accessory metal blades. Model 3000SS comes equipped with the commercial quality TFC™ Tap-For-Cord string trimmer head—the first automatic-feed head built for the professional. Other heads available include the ultra-simple, 2-string (.105) manual head designed specifically for rental-yard and other special uses. Quality features include: solid, heat-treated drive-shaft and spiral-bevel gears; anti-vibration clutch housing with dual bearings; larger, quieter muffler and air cleaner; larger gas tank.

SPECIFICATIONS:

Engine Type: Upright 2-Cycle Air Cooled **Cylinder Type:** Single Alum. Alloy Chrome Plated **Displacement:** 24.1 **Bore & Stroke mm:** 32 x 30 **Compression Ratio:** 6.5:1 **Max H.P. (H.P/RPM):** 1.3/6500 **Carburetor:** Slide Type All Position **Ignition:** Solid-State-Transistor Type **Clutch Housing:** Anti-Vibration **Lubrication (Fuel Mixture):** 25 to 1 **Fuel Capacity:** (.7L) .74Qt. **Muffler:** Spark Arrestor **Shaft:** Solid type 8mm **Reduction:** 1.26 Gear Drive **Cutting Head (Std):** 6" Dia. TFC **Cutting Swath:** 18 in. **Weight (with cutting head):** 15 lbs (6.8kg)

MODEL 4000

The high-production trimmer, brush cutter.

This is the high powered Green Machine designed specifically for specialized, day-after-day trimming of grass, weeds, and brush. A harness with hip-pad and wide handle bars provides maximum operator efficiency for such demanding operations as highway road-side maintenance. The 37.4 cc easy-starting engine has power to spare to operate the commercial TFC™ head with .105 cutting string. Other heavy-duty features include larger drive shaft and larger spiral-bevel gears. With accessory blades, the swiveling center shaft of the 4000 makes it ideal for hillside brush cutting and pruning of low-hanging tree branches.

SPECIFICATIONS:

Engine Type: Inverted 2-Cycle Air Cooled **Cylinder Type:** Single Alum. Alloy Chrome Plated **Displacement:** 37.4 **Bore & Stroke mm:** 38 x 33 **Compression Ratio:** 9.1:1 **Max H.P. (H.P/RPM):** 2.7/7500 **Carburetor:** Slide Type Float **Ignition:** Contact Point Type **Clutch Housing:** Direct Coupled With Swivel **Lubrication (Fuel Mixture):** 20 to 1 **Fuel Capacity:** (1.1L) 1.17Qt. **Muffler:** Spark Arrestor **Shaft:** Solid 10mm **Reduction:** 1.26 Gear Drive **Cutting Head (Std):** 6" Dia. TFC **Cutting Swath:** 20 in. **Weight (with cutting head):** 21 lbs (9.5kg)

MODEL 4500

The Green Machine Forestry unit.

Modern forestry practice demands fast, efficient tree and brush clearing. Here is the tool for the job. Using a combination chopping-sawing action, saplings up to 4 inches in diameter can be felled in a single stroke. One man equipped with the 4500 becomes a formidable system of forestry maintenance. This unit is specially-designed to withstand the continuous side-shock impact imposed by this type of work. Extra anti-vibration features as well as an exceptionally heavy-duty shaft are included. The special handle guards help protect the operator. The 4500 comes equipped with brush blade, saw blade and blade guard. The commercial quality TFC™ Tap-For-Cord head is available as an option.

SPECIFICATIONS:

Engine Type: Inverted 2-Cycle Air Cooled **Cylinder Type:** Single Alum. Alloy Chrome Plated **Displacement:** 37.4 **Bore & Stroke mm:** 38 x 33 **Compression Ratio:** 9.1:1 **Max H.P. (H.P/RPM):** 2.7/7500 **Carburetor:** Slide Type Float **Ignition:** Contact Point Type **Clutch Housing:** Direct Coupled With Swivel **Lubrication (Fuel Mixture):** 20 to 1 **Fuel Capacity:** (1.1L) 1.17Qt. **Muffler:** Spark Arrestor **Shaft:** Solid 12mm **Reduction:** 1.26 Gear Drive **Cutting Head (Std):** Blades **Weight (with cutting blade):** 22 lbs (10kg)

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acs from The Green Machine. No guess, no mess!

5. Give warnings but not threats. However, a worker should be clearly aware of the consequences for his unwillingness to meet the expectations set for him.

6. Give a worker frequent feedback and thanks for his help and progress. Positive feedback on shortcomings and progress, along with encouragement, build a strong working relationship.

7. Get your own emotions under control before entering a confrontation situation.

8. Do not holler, bully, or manipulate a worker into doing something. But calmly and decisively direct a worker into the area of achievement and performance you desire.

9. Avoid threatening situations. Do not suggest organizational changes which affect personnel or areas of major work or leadership responsibility without first consulting those workers who will be affected.

10. Learn to perceive employee problem situations before they manifest themselves, and take decisive, preventive action. First, check the job situation—the task involved, yours or another's supervision, co-workers, etc.—to see how that might be influencing a worker's attitutde and performance. Lastly, be aware of things outside the job which may be affecting a worker's attitude and/or performance. If a worker can confide in you as a friend, then you can point out how his work performance has been altered, help him define the problem influencing his performance, and perhaps help direct him toward a solution. Depending on the seriousness of the problem, it may be necessary to bring other supervisors or administrators into the situation. Do not try to diagnose the problem or counsel the employee.

11. Be willing to withdraw a person from a task or responsibility that is clearly beyond his present capabilities and tell him why, without demeaning him or his efforts.

In Working and Teaching.

1. Demonstrate by doing—be a working supervisor wherever and whenever possible.

2. Be willing to be a teacher. Share your knowledge and skills.

3. Allow for (expect and tolerate) mistakes; that's how we all learn.

4. Foster a working climate which permits a worker to question, suggest, invent, learn, and change.

5. Be a friend. Be willing to get involved with a co-worker. But clearly have in mind the limits of your own ability and responsibility. **WTT**

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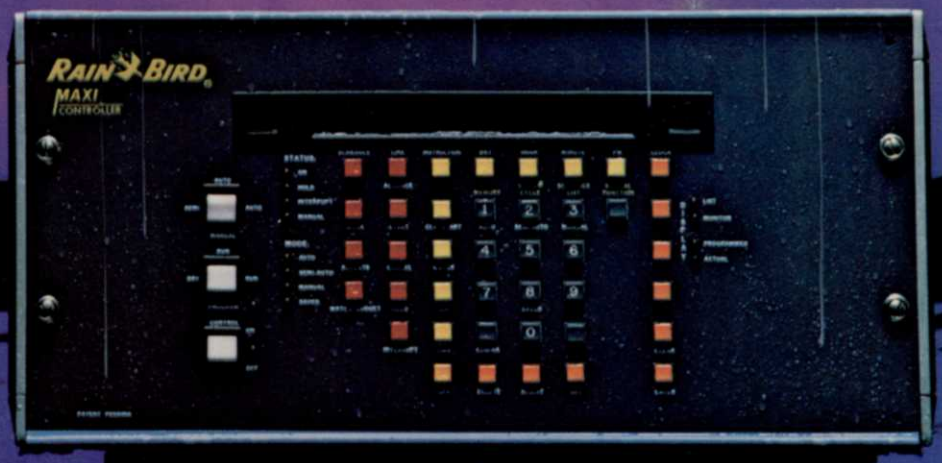

For the better part of fifty years, Rain Bird has irrigated and nurtured the soils of the earth like no one else.

Year after year, product after product, we've looked to the future and *its* needs, as well as the present.

Case in point: our Maxi™ controller.

The Maxi controller is the latest in the broadest, best-selling line of controllers in the world.

It's a computer-based wonder of a system that not only talks to Mother Nature, but interacts as well. Space-age technology, comfortably earth-bound, gives it the capability to continually monitor wind, humidity and temperature and use that information to effectively adjust its sprinklers.

Time is saved, money is saved, water is saved. "Water-budgeting" becomes a reality.

The fact that such an entry into the world of hydro-economics comes from Rain Bird shouldn't surprise anyone, really.

We saw a need for the not-too-distant future, and we filled it.

After all, bringing new ideas to life is what we've always done best.

For a technical description of the Maxi controller, or any Rain Bird® product, please write us at 7045 N. Grand Avenue, Glendora, CA 91740.

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Our lightweight but rugged, 2 cycle, hand-propelled mower.

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Our intermediate, 5 hp, 4 cycle, self-propelled mower.

COMMERCIAL 21-5
Our intermediate, 5 hp, 4 cycle, hand-propelled mower.

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BOOKS

FINAL TOUCHES PUT ON TURF BOOKS

The turf industry will soon benefit from two new books currently in production. The first, *Turfgrass Management,*" by Dr. Al Turgeon is due out this month. The second is Dr. James Beard's remake of a book by H. Burton Musser entitled *Turf Management for Golf Courses.*

Turgeon, who made his reputation at the University of Illinois, Champaign-Urbana, now directs a Dallas research branch of Texas A&M. The new book is illustrated by F.A. Giles, associate professor of horticulture at the University of Illinois. This publication was designed to fit the niche between the highly technical publications and the insufficiently technical ones, a niche growing as the competency of the turfgrass manager rises to new levels.

Turfgrass Management has nine chapters, depending heavily on illustrations to make information directly applicable to field conditions. Every effort is made to explain turfgrass growth and disease in terms of a plant's position in its environment, a holistic approach.

The first chapters examine the basics of turfgrass growth. A chapter on taxonomy and climatic adaptation provides data on identification and cultural requirements of a wide variety of grasses. Middle chapters look at the components of the turfgrass environment — atmospheric, soil, and biotic influences that effect growth, health, and propagation. Others chapters cover cultural practices, pest control, propagation for maximum yield, and customized propagation and maintenance techniques for a variety of sites. Appendices contain relevant data on pesticide chemistry, calculations, and conversion. The book includes a glossary.

If you are familiar with Dr. Turgeon's work in the past, chances are you'll want a copy of his book. One turf specialist in the Midwest told us he expects to use the book in the classroom this coming fall. You can order the book by filling out the coupon on page 55.

Dr. Beard has spent the last five years remaking a book with tremendous history, *Turf Management* by H. Burton Musser. The new book carries the title *Turf Management for Golf Courses* and in Beard's words is not a revision. At least six months will pass before the book is available for purchase. It is a broad look at all turf practices on golf courses, including bank stabilization, irrigation, greens, tees, etc. Apparently, the book will include history drawn from Musser's book as well as up-to-date technical information. We'll keep you informed on the progress of the book in production.

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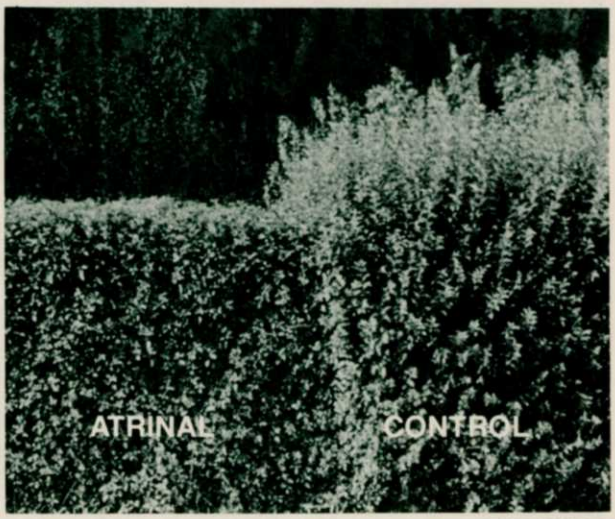

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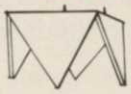
- ☐  New Standard Tee Shelter
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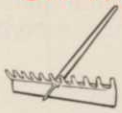
- ☐  New Standard Duo-Rake Trap Rake
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typical city to show how to obtain cooperation in a given community.

Dr. Richard Lawson, director of the institute for the last 25 years, said, "I think the program was exceptionally good." He said that all chairmen and panels of the programs were concerned about the economy and discussed issues, such as alternative sources of power, turf efficiency, retardants, and less frequent mowing. Next year's program, to be held at the same site in February, will include more topics on private funding and how to support services with less income, Lawson said.

PESTICIDES

EPA wants further study on Surflan

The Environmental Protection Agency has asked for investigation of the pesticide Surflan, made by Eli Lilly & Co., after some workers charged it may lead to birth defects.

Although no evidence from the EPA or Lilly experiments indicates any hazards from Surflan, the trade name for oryzalin, workers at a GAF Corp. plant in New York, which makes the chemical, requested a ban on it. The International Chemical Workers Union claimed that members working at the GAF plant showed several children with birth defects.

A meeting between the EPA, Lilly, and a New York doctor who raised the question about Surflan's effects on workers couldn't identify any connection between the chemical and birth defects. The doctor termed it, "multiple coincidences of birth."

Lilly ran additional studies looking for possibilities of birth defects, and data from one of these last studies was questioned, said an Eli Lilly spokesman. "We felt data, which was supported also by outside people, was sufficient," he said.

PESTICIDES

Group petitions rules for aerial application

Friends of the Earth have petitioned Federal Aviation Administration and Environmental Protection Agency officials to tighten regulations for aerial application of pesticides to require written permission of adjacent property owners within 1,000 feet of that property.

The petition to the EPA further requests permission of adjacent property owners be required to make ground application within 250 feet of boundary. This could preclude retail nurseries and homeowners from any spraying.

The American Association of Nurserymen will file against the proposal, which assumes all pesticides are very hazardous poisons and that registration label restrictions on the applicator as to how a chemical is to be applied, on what plants and for control of what pests is ineffective.

The AAN urges members and all interested to forward comments to: Document Control Officer, Chemical Information Div., (TS-793), EPA,

Continues on page 53

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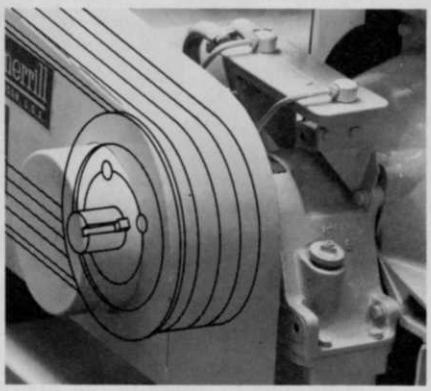

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CORPORATE OFFICE GROUNDS RECEIVES GOLF COURSE CARE

By Robert W. Baird, Louisville, KY

A groundskeeping crew was "transplanted" from a suburban Chicago golf course to a corporate headquarters and has applied many of the same techniques used in golf course management to large estate management.

The mowers, tree trimmers, shrub pruners, and turf managers still get to work at 6 a.m. like they used to do to beat the golfers, but now it's mainly out of habit. The crew has renovated some 30 acres of turf that now look like fairways.

Boldly green against the white steel architecture of the Baxter Travenol Laboratories headquarters in Deerfield, the landscape appears like a well-tended golf course. However, not a single flag, green, tee or golfer can be seen. Instead you might see corporate executives taking lunchtime nature strolls.

The golf course comparison is not contrived. Landscape architectural firm Sasaki Associates, Watertown, MA, wanted a grounds less maintenance-demanding than a golf course in their original landscape design for the complex which opened in 1975. But the turf management technique of Otto Damgaard Sons, Des Plaines, IL, landscape contractors, which took over maintenance responsibility of the grounds in early 1979, showed painstaking methods not unlike those used by golf course managers.

The maintenance crew of Damgaard, under the direction of Bob Block, is the same one that for years had tended the greens and fairways of Sportsmen's Country Club in nearby Northbrook. But that was before development pressures brought a change in ownership at Sportsmen's and a change in plans for the golf course site. Sportsmen's was to be no longer a golf course but a housing development. It was only after concerned citizen action that 18 of the 45 holes at Sportsmen's were preserved as a public course under the Northbrook Park District.

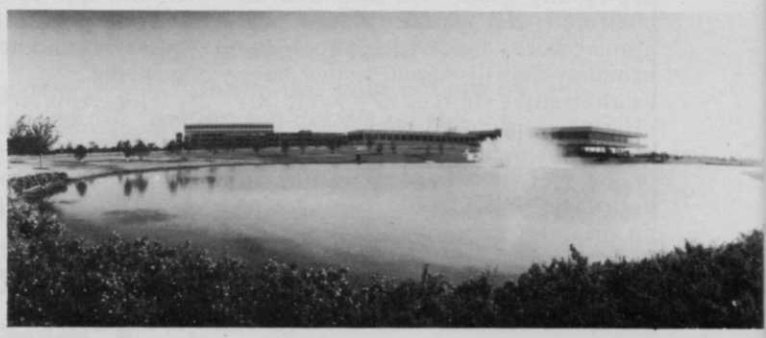
So Block and his crew found themselves in need of a job. A third party put them in touch with Damgaard and the crew of Sportsmen's became the crew of Damgaard, most of them assigned to the Baxter Travenol operations.

One of the first assignments for Damgaard's new crew was to upgrade the turf on 30 acres of high visibility turf on the 188-acre site located along the well-travelled Tri-State Tollway linking Chicago with Wisconsin. Fescue had taken over the area.

"I was quite sure we could turn the situation around," Block recalled. He believed the turf could be re-established without the expense and trouble of sodding or re-seeding.

"The idea was not to tear it up, but upgrade it," says Ronald Damgaard, president of the landscape firm.

What resulted was a seeding operation using a seeder equipped with a series of thatching knives three inches apart that cut slits into the turf to a depth of ½ inch. Seed was metered precisely and directed by tubes on the seeder.



Baxter Travenol Headquarters after renovation to fairway-like appearance.

"You put the seed where you want it. You get a much surer catch and a purer stand, quicker,"said Block. And because seed loss was only a fourth of that in conventional methods, only 35 pounds per acre was needed. The operation, completed in the fall, used five hybrid Kentucky bluegrass varieties. Today's turf is a noticeable improvement over a fescue-dominant stand.

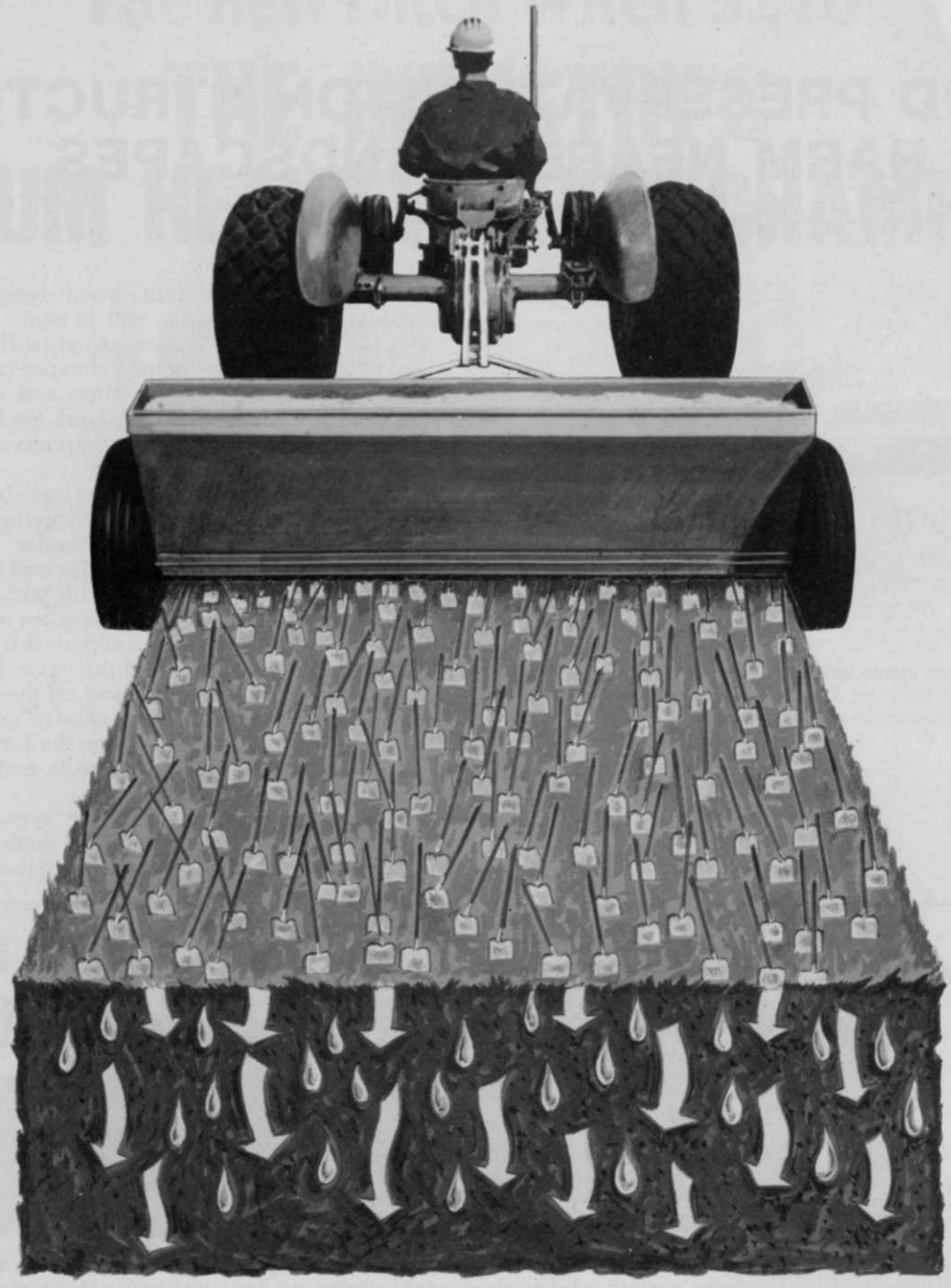
Another operation Damgaard and Block credit with healthier turf was aerification with a "calcined clay" aggregate used as a soil conditioner. Such conditioning is desirable in the highly clay, hardpan soil predominating in the immediate Chicago area. The clay holds too much water; breaking up the soil improves the drainage. A great deal of topsoil understandably was brought in during site development. To properly drain trees, underground drainage tiles were used.

Block keeps a flexible fertilization program using monthly, nearly weekly, applications of both liquid and dry materials, as well as fall applications of potash and Milorganite. The liquid fertilizer is a water-soluble 20-20-20.

Block and his crew say expertise comes from close familiarity with turf, trees and shrubs, living with them on the job. One of his crewmen, Bill Israel, a 43-year veteran of the golf maintenance business, is assigned to special projects. He trims special trees on the grounds, and keeps close tabs on a focal point contorted Scotch pine inside a Japanese garden. The pine rises above a glazed tile courtyard, but does not get a lot of water because the tile absorbs solar heat. The pine receives water two hours twice a week.

Israel was able to nurture grass to grow on the steps of a formal stairwell that leads, for symbolic effect, from the corporate headquarters to the edge of one of several retention basins in front of the site.

The care provided by a former golf course crew has helped make Baxter Travenol a landscaped showplace. **WTT**



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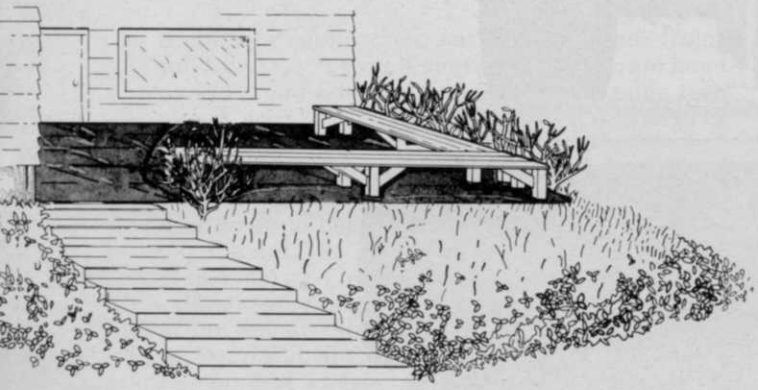
WOOD PRESERVATIVES ON STRUCTURES MAY HARM NEARBY LANDSCAPES

By Warren T. Johnson, Department of Entomology, Cornell University, Ithaca, NY



Landscape plants killed or injured by copper salts washed from patio benches. The benches were made from pressure treated construction lumber.

Durable, decay resistant wood types such as cypress, redwood, cedar and to some extent oak and ash are becoming increasingly difficult to get and to pay for. Consequently, cheaper construction lumber, primarily the soft pines and spruce, are being used for landscape purposes. Such lumber is often treated with wood preservatives to resist decay.

In 1979, a plant health problem was observed in a suburban housing community involving plants adjacent to a patio. The rectangular patio was bordered by a house on two sides and beautifully terraced, on the other sides, with periwinkle and euonymous. In early summer, benches made of soft pine pressure treated with a copper salt were set in place on the terrace sides of the patio. The day after installation the owner hosed off the benches to remove the surface of green colored copper salts. During the hosing, the leaves on the terrace plants were splattered with diluted salts and the roots received all of the washwater.

Within one week, phytotoxicity symptoms were noted and within two weeks the euonymous was defoliated. Periwinkle plants within two feet of the

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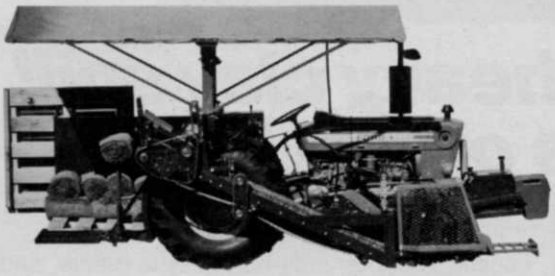

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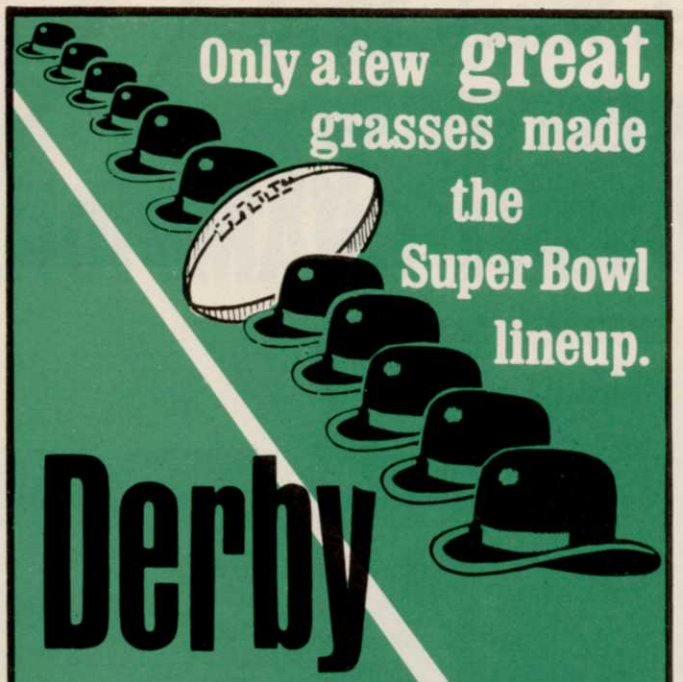

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patio edge were likewise defoliated and in four weeks those within 18 inches were dead. In four weeks phytotoxic symptoms, of leaf drop and varying degrees of chlorosis, were evident down slope for a distance of four to six feet. Symptoms were less severe as the distance from the patio edge increased.

Nine weeks after the patio benches were installed, impatiens, a bedding plant considered highly reactive to salts, were planted in the area. Those impatiens closest to the patio, within the 18 inch band, defoliated within six days, indicating that the copper salts had not leached sufficiently to permit their growth. The periwinkle that survivied nine weeks began to refoliate although the leaves were stunted. The euonymous did not refoliate but the new buds appeared healthy.

In the described situation a heavy rain would likely have produced the same effect as hosing the benches. Since recovery was observed late in the growing season it is assumed that dilution of the copper salts will continue during the winter to nonsymptomatic levels in the spring.

Although the common wood preservatives are toxic to plants, there is little doubt that treated lumber will continue to be used in outdoor living areas. Paints and penetrating oils applied to treated lumber will give some protection from copper preservative. Where the natural appearance of the wood is important, use a clear penetrating oil such as CFW Clear Wood Finish. Such products, available in paint stores, are said to seal in the preservative salts and allow the natural grain to show through.

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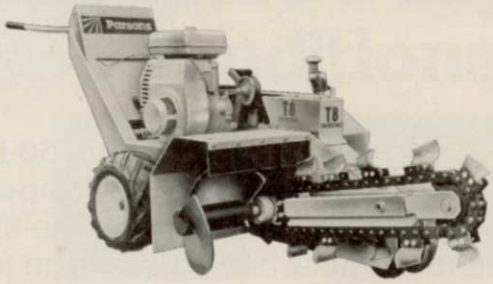

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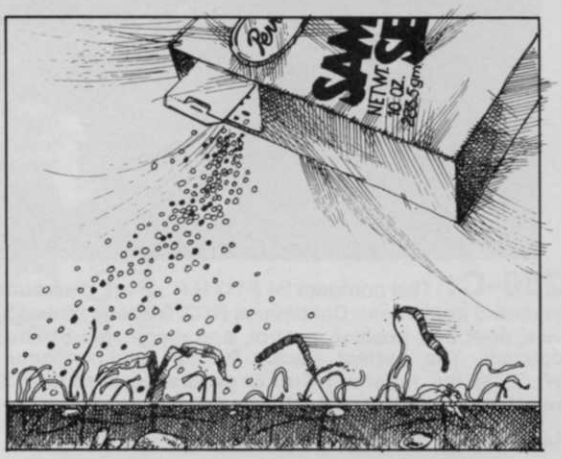

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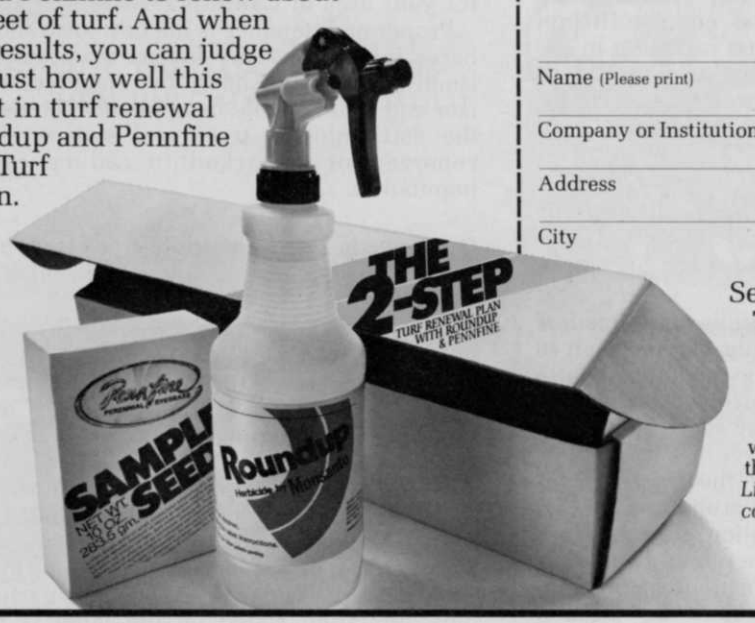

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *How do you remove an oil spill from turf?*

A: The only reference that I could find suggested applying detergent granules to the contaminated area and hosing with a vigorous spray application of water. The suds will float the oil to the surface and should be removed with a vacuum. Treated turf should recover in about two weeks for most petroleum product spills.

A: *Can phloem necrosis be treated successfully with chemicals?*

A: Phloem necrosis is caused by a submicroscopic mycoplasmalike organism and is spread by the whitebanded elm leafhopper *(scaphoideus luteolus)* and possibly by other leafhoppers. Injections with tetracycline have resulted in symptom remissions in some cases, but in most Northern areas death occurs so soon after symptoms occur that treatments are impractical.

Q: *What will be the effects of newly installed high sodium light fixtures on trees and nursery stock?*

A: High pressure sodium (HPS) lamps emit light in the red wave lengths which triggers continuous growth in some woody and herbaceous plants. Prolonged shoot growth and leaf retention expose plants to frost injury and winter dieback.

Dr. Cathey, horticulturist with the U.S. Department of Agriculture Science and Education Administration, has tested over 50 kinds of trees and shrubs and classified them according to their sensitivity to night lighting. This sensitivity should be considered when selecting trees for areas in close proximity to HPS lighting. Consideration should also be given to metal halide or improved mercury lighting, both of which are less energy-efficient than sodium lamps but have less radiation in the wave lengths that induce continuous growth.

Low pressure sodium lamps are said to have little or no effect on plant growth at the intensity used for outdoor lighting.

Q: *I'm considering using milky spore disease this season, but would like to know all the facts. All the information I've reviewed thus far has been one-sided or "sketchy."*

A: The bacteria, *Bacillus popillae* and *Bacillus lentimorbus* infect the white grubs of more than 40 species of beetles, although the Japanese beetle grub is the most extensively affected and is the only beetle grub for which milky spore bacteria is registered.

Commercial preparations of the bacteria are made by grinding up infected grubs and mixing with talc powder. The preparation is usually applied in a 4-foot grid pattern at a rate of two grams per spot. Spring and fall applications are recommended although treatments may be applied anytime the ground is not frozen.

The spores are spread from the spot areas by infected grubs, water movement and by other natural agents. The bacteria are host specific, and do not infect insects other than beetle grubs nor will they infect earthworms, birds, mammals or plants.

In spite of the obvious desirability of biological control, I am aware of only a few milky spore control programs that have been successful. Beetle populations and resultant injury to ornamentals are not reduced significantly unless treatments are done on a community basis. In addition, considerable turf injury can occur for several years following treatment until the bacteria have had sufficient time to spread throughout the soil. Insecticide applications during this initial establishment period are generally not compatible with a milky spore control program because insecticides kill the grubs necessary for multiplying and spreading the bacteria.

Q: *I have received various treatment methods for bark beetles infesting different species of pine trees in this area (California). These trees are advanced in growth, usually 6" to 36" in diameter at the base, with rough bark. Please advise on best treatment and chemical use, particularly where the pests have already bored into the live wood.*

A: Little can be done to control borers once they are beneath the bark. Insecticides do not penetrate the bark sufficiently to kill many of the larvae, and trying to dig them out may destroy a larger area than the borer would destroy if left alone.

Trees can be protected from beetle infestation by spraying the trunk with lindane, being careful to thoroughly cover all bark surfaces and crevices. One application in early March is recommended for your area of California.

Proper maintenance is the best insurance against borer infestation. Any factors that cause a stress condition on trees should be remedied, and fertilizer and water should be applied when deficient in the soil. Infested trees and stumps should be removed or debarked to reduce the insect population.

Q: *How can I prevent apple trees from producing fruit? Can this be controlled by pruning or using chemicals without damaging foliage?*

A: There are a number of chemicals registered to eliminate undesirable apples, but we have not had consistent results with the products we have tested. Timing and environmental conditions are major factors in determining the degree of control, and apple varieties may differ in their response.

Union Carbide produces a plant growth regulator with the trade name FLOREL™ which gave very good results without noticeable injury in a limited test last year. We are planning to continue the study on a wider range of apple varieties. The only limitation stated on the label is that fruit elimination may not be satisfactory on small, red-fruited varieties of crabapples.

Room 447, East Tower, 401 M St. S.W., Washington, DC 20460; and Federal Aviation Administration, Office of Chief Counsel, ATT: Rules Docket (AGC-24), Docket 19448, 800 Independence Ave., S.W., Washington, DC 20591.

SOIL

College to give workshop on tree soils

The State University of New York College of Environmental Science and Forestry (ESF) will host a five-day workshop on North American tree nursery soils July 28-Aug. 1.

Co-sponsored by ESF, the U.S. Forest Service, and the Canadian Forest Service, the workshop is designed to instruct tree nursery managers in the methods and benefits of managing tree nursery soils.

According to Dr. Lawrence P. Abrahamson, senior research associate at ESF and general program chairman for the workshop, the workshop will provide nurserymen with information on how to grow better seedlings faster and at a lower cost through soil analysis and management.

Some of the topics which will be covered include basic nursery soil physical properties, soil sampling techniques, the relationship between seedling growth and development and soils, seedling insect and disease problems related to nursery soil conditions, and nursery soil fertility.

For further information, write: Dean, School of Continuing Education, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210.

HORTICULTURE

Indiana nurserymen present new award

In honor of the late Robert Forbes of Vincennes, IN, the first Robert Forbes Memorial Scholarship was presented at the Indiana Association of Nurserymen's annual winter meeting. The first winner was Mary K. Primus, a student at Vincennes University.

Friends of Mr. Forbes established and funded an endowment in his name which will provide an annual $500 scholarship to a second year Landscape Horticulture student at Vincennes University. Each winner also receives a plaque.

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Fusarium Blight added to fungicide label

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Continues on page 60

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by Houston Couch

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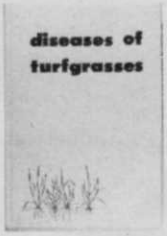

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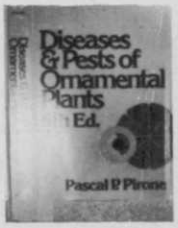

DISEASES & PESTS OF ORNAMENTAL PLANTS
by Pascal Pirone

This standard reference discusses diagnosis and treatment of diseases and organisms affecting nearly 500 varieties of ornamental plants grown outdoors, under glass or in the home. Easy to understand explanations of when and how to use the most effective fungicides, insecticides and other control methods. **$20.00**

DISEASES OF SHADE TREES
by Terry Tattar

Because shade trees require specialized maintenance rarely used in the forest, this text seeks to aid the arborist in providing necessary care to maintain vigor and prevent shade tree diseases. An indepth look at infectious and non-infectious tree diseases. Plant pathology not necessary.
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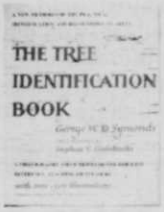

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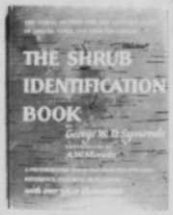

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The Land Reclamation Report

Acid rain follows SO_2 emissions in soft coal holdup

As workable compromises for sulfur dioxide emissions are being worked out and utility companies have installed costly scrubbers, a new threat to soft coal use is gaining momentum, acid rain.

The governor of a large coal using state, Ohio's James Rhodes, has appointed a task force to get solid answers on acid rain. Dr. T. Craig Weidensaul, environmental studies laboratory head at Ohio Agricultural Research and Development Center in Wooster, has been named chairman of the eight-member group. Members of the group include Ohio Mining and Reclamation Association President Neal Tostenson, environmental control managers of utilities and key university staff members. Rhodes has defended Ohio industry against acid rain accusations from Federal and bordering state officials.

Weidensaul said there are many other minerals besides those in coal which mix with rain to form acid rain. Pinpointing the sources of the other minerals will be difficult, however.

Windfall tax passed, Coal conversion urged

Funds from the windfall profits tax will be used to convert 107 units at 50 powerplants to coal and to provide pollution reduction devices at existing coal-powered generating plants.

A total of $4 billion is allocated for the conversion in the first phase. Another $6 billion will be spent in phase two in an effort to trim oil imports by one million barrells per day by 1980.

Reforestation is topic of Texas short course

The focus will be on reforestation of strip mined land during the first annual short course sponsored by the Texas Agricultural Extension Service Forestry Project at Texas A&M, College Station, June 9-11.

The program will include sessions on soils, site preparation, species and utilization. Information will apply to any disturbed soils. Sessions begin at 1 p.m. Registration fee is $40 and includes a copy of the proceedings. For more information contact Dr. Michael Walterscheidt, Department of Forest Science, Texas A&M, College Station, TX 77843.

Wind erosion damage in plains tripled

Wind damaged almost three times more land than the year before in the Great Plains due to low fall rainfall and lack of snow cover. Texas was hardest hit of the Plains states with more than one million acres

Continues on page 60

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SOD PRODUCER NEWS

Study relates effect of petroleum spills on turf

A field study conducted on 'Tifgreen' bermudagrass has determined the injury symptoms and subsequent recovery rates from petroleum spill damage.

D. Johns and J.B. Beard of the department of soil & crop sciences, Texas A&M University, applied five petroleum products commonly used in turfgrass maintenance equipment—gasoline, motor oil, hydraulic fluid, brake fluid, and grease. They then attempted to treat the turf with calcined clay fines, activated charcoal, and detergent.

The detergent washing proved to be an effective treatment for turf with spilled hydraulic fluid, brake fluid, and motor oil. In two cases, they achieved complete recovery three to six weeks sooner than with other corrective procedures.

None of the corrective treatments were effective on either the gasoline or grease damaged turf. The bermudagrass recovered rapidly (three to four weeks) from gasoline spills without corrective procedures. It took more than 10 weeks to recover from grease spills.

Sod Producers prepare for summer meeting in Canada

The American Sod Producers Association will be holding its annual summer conference in Edmonton, Alberta, Canada, and expects a good turnout, according to convention chairman, Don Stumborg.

Highlights of the conference expect to be a tour of the 400-acre Big Lake Sod Farm, where an irrigation demonstration will take place, and the annual field day at the 2,000-acre Gem Sod Farms. Exhibits during the field day will include a variety of seed and sod equipment, chemical companies, and others concerned with the sod industry.

The conference will run from July 20-22 and simultaneously with the Klondike Days, a 10-day fair which commemorates the discovery of gold in the Yukon Territory that made Edmonton a gateway city to the north. For more information, contact ASPA Executive Director, Bob Garey, 9th and Minnesota, Hastings, NE 68901, 402/463-4683, or Don Stumborg, Gem Sod Farms, Ltd., RR 6, Site 3, Box 25, Edmonton, Alberta, 403/973-3311.

Banner Chewings Fescue gains Canadian license

An outstanding new Chewings Fescue variety, named Banner, has been awarded a Canadian license by Agriculture Canada, Plant Products Div. in Ottawa on an application by Oseco Inc. of Brampton, Ontario. Banner was developed by the New Jersey Agricultural Experiment Station, Rutgers University, New Brunswick, NJ, and was released in 1975. It was awarded a USDA Plant Variety Protection Certificate in 1977.

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Reclamation
from page 56

damaged. South Dakota, Kansas, and Montana also ranked high in damage.

Of the total acreage damaged, 96 percent was cropland and three percent was rangeland. Topsoil loss of cropland is a critical problem with American agriculture supporting such measures as no-till farming and planting a cover crop during unproductive months. Rangeland losses are considered a threat to wildlife and natural fauna and floral.

News *from page 53*

ways. Application of the Rhone-Poulenc product should begin when conditions first become favorable for disease development. Two additional applications should be made at 14 to 21 day intervals.

Chipco 26019 is also registered for control of Dollar Spot (including Benomyl resistant strains), Brown patch, Helminthosporium leaf spot and melting out, Fusarium patch, and suppression of gray and pink snow mold.

SOIL

No-tillage cuts K leaching losses

Potassium leaching is a serious problem on sandy soils, but Delaware Agricultural Experiment Station researchers have found that no-tillage reduces the problem dramatically.

The researchers compared fields that were in continuous corn for eight years, from 1972 to 1979. Half the plots were plowed, disked, and cultivated, while half were planted without tillage in corn crop residues from the previous season.

In each case, 200 pounds of potash were broadcast each year for the entire period. By 1979, there was about 60 percent more soil potassium at the zero-to-three-inch soil depth on the no-till fields.

On the tilled fields, the level of soil potassium ranged from six parts per million (or 134 pounds per acre) at the zero-to-one-inch soil depth, to 127 parts per million (or 254 pounds per acre) at the six-to-nine-inch depth—clear evidence of leaching.

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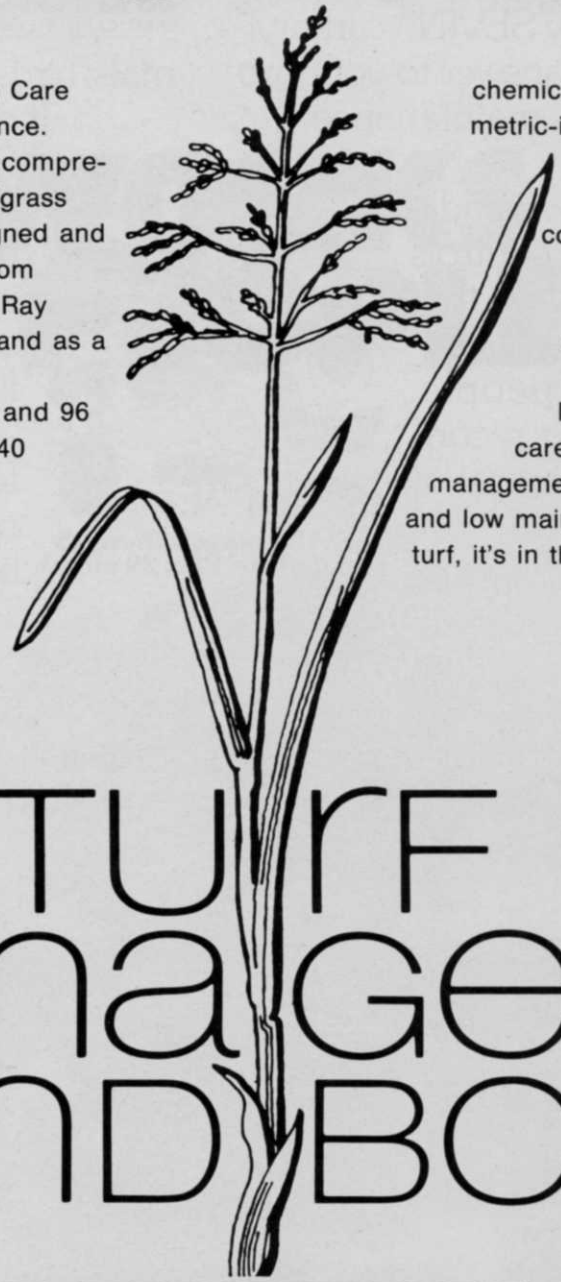
The book contains 150 illustrations and 96 color photographs. Data includes 240 tables and forms. Included are specifications for rootzones, employment, calculations for chemical applications, and extensive metric-imperial conversion. Business and technical aspects of turfgrass management are covered in this 424-page book. Planning, purchasing, hiring, construction, and plant selection are put together for easy on-the-job reference. Markets covered include lawn care, sod production, golf course management, cemeteries, athletic fields, and low maintenance areas. If it concerns turf, it's in the Turf Managers' Handbook.



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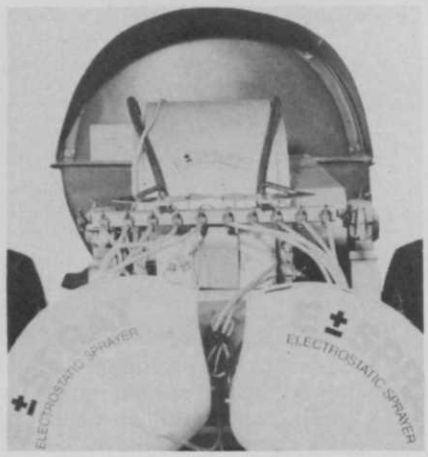

the University of Western Ontario under Canadian government funding. The charge generator is powered by the tractor's 12-volt electrical system. The charging system must be fitted to a low volume spray system. It is the sprayer of the future.

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Model 284D diesel tractor comes with a front-wheel drive attachment for added traction. A three-cylinder, 30-horsepower diesel engine powers the International Harvester machine. It has advanced hydraulic lift and independent hydraulic brake

systems and full instrumentation, easily reached controls, and a cushion-back seat for ease of operation and comfort.

Other features include positioned-controlled category 1, three-point hitch; two-speed PTO that delivers 27 horsepower to handle a variety of attachments; and easy-shift, four-speed transmission with high-low range selectors for a total of eight forward speeds and two reverse.

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Rugged HT23 gasoline tractor contains a powerful twin-cylinder 23-horsepower cast iron Kohler engine and hydrostatic drive with single pedal control that eliminates shifting and leaves both hands free for steering and control of attachments. Two-spool hydraulics raise or lower optional attachments while simultaneously changing their angle. The massive two-speed rear axle and differential provide direct in-line power, shaft driven, from engine to transaxle for good energy transfer. FMC Corp. makes this Bolens model

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motor on each wheel. The suspension for the centrally-mounted tool frame is a narrow arched boom between front and rear wheels which enables driver to see all the transverse tool bar and to position the implements close to rows of growing plants.

A compact system of simple levers controls the vehicle: one lever is for forward and reverse travel; another operates the parallel linkage, raising

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The strongest Dutch elm disease protection you can give a tree.

ARBOTECT 20-S fungicide helps make it possible to save many elm trees that otherwise would be lost.

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WT&T

EVENTS

The current issue of WEEDS TREES & TURF carries meeting dates beginning with the following month. To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 9800 Detroit Ave., Cleveland, OH 44102.

2nd Exhibition for Horticulture and Landscape Construction, "Gruen 80," Basel, Switzerland, **Apr. 12-Oct. 12.** Contact Beat Baechler, 104 South Michigan Ave., Chicago, IL 60603, 312/641-0050.

MIS (Management Information Systems) Seminar, Miami, FL, **May 13-14.** Contact John Shaw, Executive Director, ALCA, 1750 Old Meadow Rd., McLean, VA 22101, 703/821-8611.

American Society of Golf Course Architects, Glen Eagles Hotel, Scotland, **May 15-24.** Contact Paul Fullmer, Executive Secretary, 221 N. LaSalle St., Chicago, IL 60601, 312/372-7090.

Texas A&M University Turfgrass Research Field Day, TAMU Turfgrass Field Lab, Agronomy Road, TAMU Campus, College Station, TX, **May 21.** Contact Dr. Richard Duble or Dr. James Beard, Dept. of Soil & Crop Sciences, Texas A&M University, College Station, TX 77843.

Tree Care—Urban Forestry Foreman Training, Kent, OH, **June 2-13;** and **Sept. 15-26.** Contact Richard E. Abbott, Davey Environmental Services, 117 South Water Street, Kent, OH 44240, 216/ 673-9511.

Fertilizer Institute Marketing Conference, The Greenbriar Hotel, White Silver Springs, WV, **June 8-11.** Contact Barbara Schoen, The Fertilizer Institute, 1015 18th St., NW., Washington, DC 20036, 202/466-2700.

Kentucky Cemetery Association Annual Meeting, Executive Inn, Louisville, KY, **June 12-14.** Contact Lewis C. Tingley, Resthaven Memorial Park, P.O. Box 18066, Louisville, KY 40218, 502/491-5950.

NRPA National Forum for Board/Commisssion Members, Betendorf, IA, **June 12-15.** Contact Ted Flickinger, NRPA, 600 E. Algonquin Rd., Des Plaines, IL 60016, 312/297-6260.

Residential Landscape Design Course I, Milwaukee, WI, **June 18-20.** Contact John Shaw, Executive Director, ALCA, 1750 Old Meadow Rd., McLean, VA 22101, 703/821-8611.

Metropolitan Tree Improvement Alliance papers on "Urban Trees and Their Soils," Rutgers University, New Brunswick, NJ, **June 18-20.** Contact Dr. David F. Karnosky, Cary Arboretum, Box AB, Millbrook, NY 12545, 914/677-5343.

26th Grass Breeders Work Planning Conference, Utah State University, Logan, UT, **June 18-20.** Contact K.H. Asay, Research Geneticist, Crops Research Laboratory, U.S.U.UM63, Logan, UT 84322.

Residential Landscape Design Course I, Tucson, AZ, **June 23-25.** Contact John Shaw, Executive Director, ALCA, 1750 Old Meadow Rd., McLean, VA 22101, 703/821-8611.

Lawn Institute Annual Meeting, Del Coronado Hotel, San Diego, CA, **June 23.** Contact Robert W. Schery, Director, 991 W. 5th St., Marysville, OH 43040, 513/642-1777.

American Seed Trade Association, Del Coronado Hotel, San Diego, CA, **June 23-25.** Contact Dr. Harold D. Loden, Executive Vice President, Turfgrass Div., 1030 15th St. NW, Washington, DC 20005, 202/223-4080.

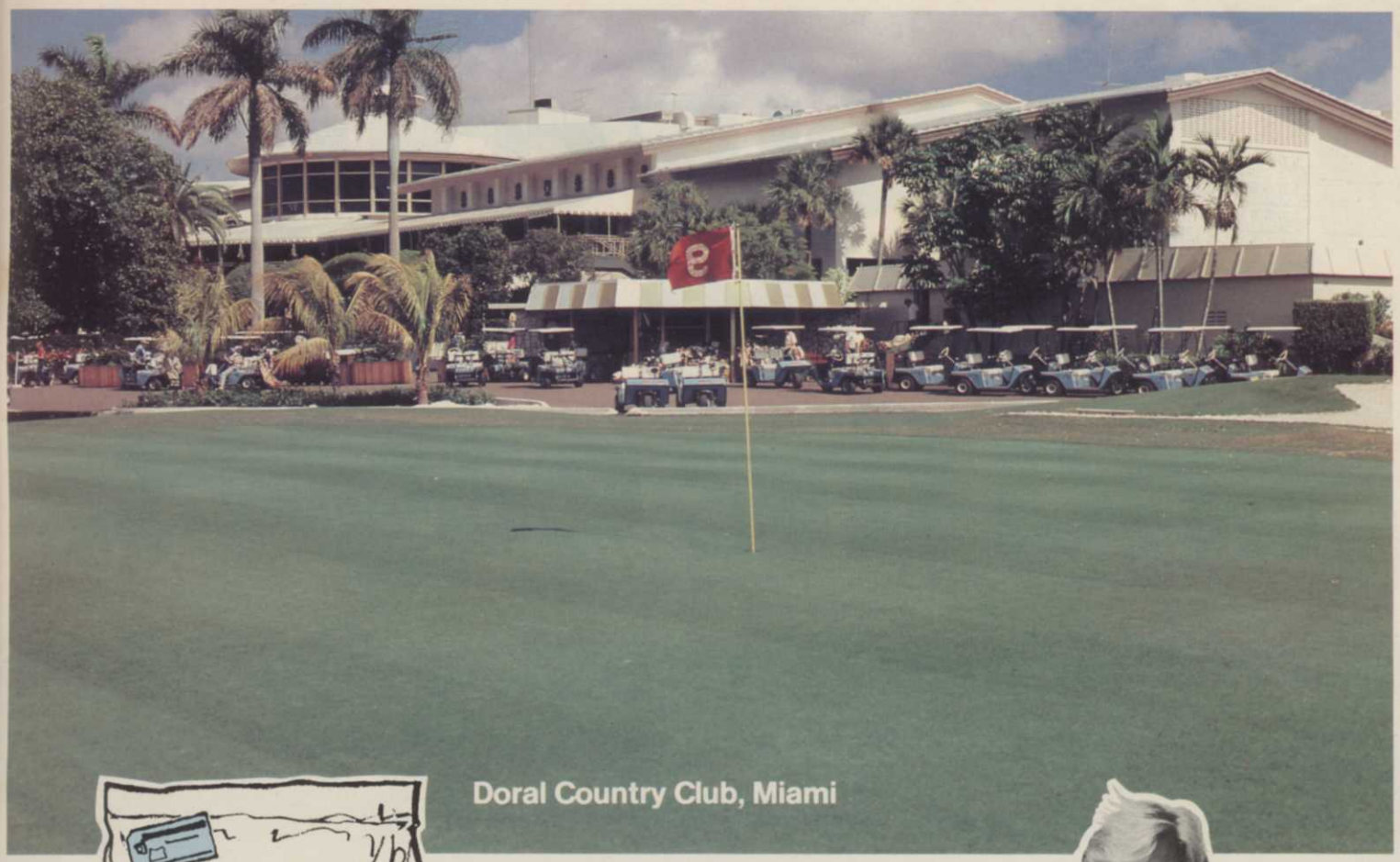
Dutch elm disease training course, Sault Ste. Marie, Ontario, **June 23-26.** Contact Dr. Peter F. Rice, c/o Royal Botanical Gardens, Box 399, Hamilton, Ontario, Canada. L8N 3H8, 416/527-1158.

University of Massachusetts Field Day, South Deerfield Plot, South Deerfield, MA, **June 25.** Contact Dr. Joseph Troll, Dept. of Plant and Soil Science, Stockbridge Hall, Amherst, MA 01003, 413/545-2353.

Residential Landscape Design Course II, Phoenix, AZ, **June 26-28.** Contact John Shaw, Executive Director, ALCA, 1750 Old Meadow Rd., McLean, VA 22101, 703/821-8611. .

Niagara Falls Convention & Trade Show, Niagara Falls Convention Center, Niagara Falls, NY, **June 30-July 3.** Contact Margaret Herbst, Executive Secretary, NY State Nurserymen's Assn., Inc., 101 Park Ave., New York, NY 10017.

American Association of Nurserymen's 105th Annual Convention and Trade Show, Radisson Muehlebach Hotel, Kansas City, MO, **July 13-16.** Contact Harry C. Kiely, Administrator, American Association of



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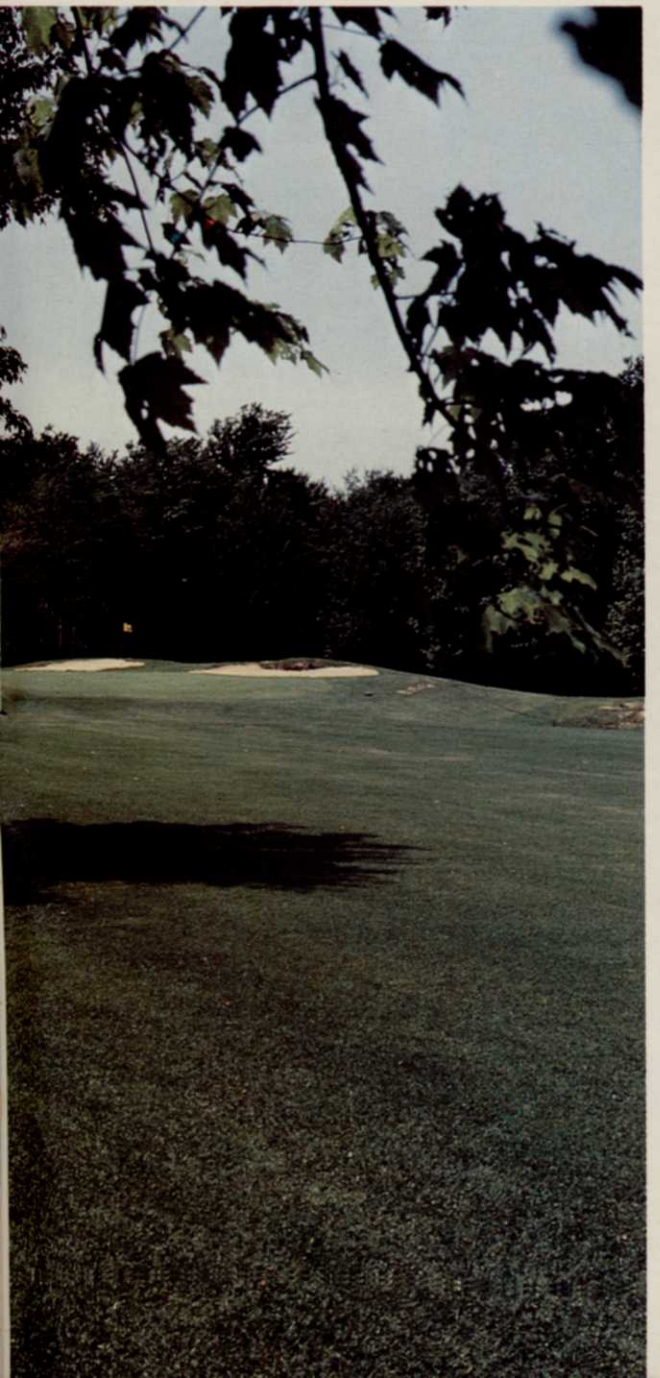

Nurserymen, Inc., 230 Southern Building, 15th & H Streets, N.W., Washington, DC 20005, 202/ 737-4060.

Aquatic Plant Management Society annual meeting, Sarasota Hyatt House, Sarasota, FL, **July 13-16.** Contact International Plant Protection Center, Oregon State University, Corvallis, OR 97331.

American Sod Producers Association summer convention & field days, Four Seasons Hotel, Alberta, Canada, **July 20-22.** Contact ASPA, Bob Garey, Executive Director, 9th & Minnesota, Hastings, NE 68901, 402/463-4683.

North American Forest Tree Nursery Soils five-day workshop, State University of New York College of Environmental Science and Forestry (ESF), Syracuse, NY, **July 28-Aug. 1.** Contact Dean, School of Continuing Education, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210, 315/473-8711.

Penn Allied Nursery Trade Show, Hershey Convention Center, Hershey, PA, **July 29-31.** Contact S. Howard Davis, Executive Director, Pennsylvania Nurserymen's Assn., 234 State St., Harrisburg, PA 17101, 717/238-1673.

Southern Nurserymen's Trade Show, Atlanta Convention Center, Atlanta, GA, **Aug. 2-6.** Contact Tommy Henegar, Southern Nurserymen's Assn., 3813 Hillsboro Rd., Nashville, TN 37215, 615/383-5674.

Roadside Vegetation Management and Manipulation Program, San Antonio, TX, **Aug. 4-8.** Charles T. Edson, Assistant Chief Engineer Construction & Maintenance, New Jersey Department of Transportation, 1035 Parkway Ave., Trenton, NJ 08625.

Fertilizer Institute Trade Fair, Roe Vartle Hall, Kansas City, MO, **Aug. 5-6.** Contact Barbara Schoen, 1015 18th St., NW., Washington, DC 20036, 202/ 466-2700.

Rutgers Turfgrass Research Day, New Brunswick, NJ, **Aug. 6.** Contact Ralph E. Engel, Research Professor of Turfgrass Management, Rutgers University, P.O. Box 231, New Brunswick, NJ 08903, 201/932-9427.

Residential Landscape Design Course I, Seattle, WA, **Aug. 7-9.** Contact John Shaw, Executive Director, ALCA, 1750 Old Meadow Rd., McLean, VA 22101, 703/821-8611.

Residential Landscape Design Course II, Seattle, WA, **Aug. 11-13.** Contact John Shaw, Executive Director, ALCA, 1750 Old Meadow Road, McLean, VA 22101, 703/821-8611.

Iowa State University Turfgrass Field Day, Horticulture Research Station, Ames, IA, **Aug. 12.** Contact A.E. Cott, Extension Horticulturist, Dept. of Horticulture, Iowa State University, Ames, IA 50011, 515/294-1870.

Central Plains Turfgrass Foundation Field Day, Kansas State University Turf Conference, KSU Union, Manhattan, KS, **Aug. 13.** Contact Dr. R.N. Carrow, Horticulture Dept., Waters Hall, Kansas State, Manhattan, KS 66506, 913/532-6170.

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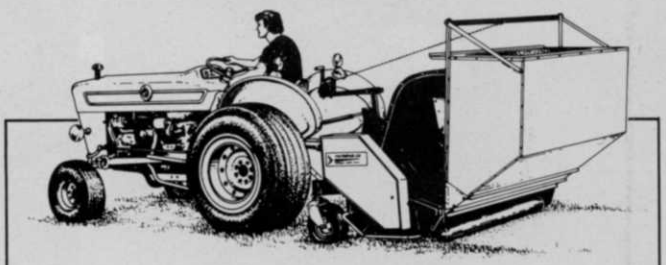

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A companion product from ORTHO is ORTHOMITE™ Ornamental Miticide. It's the perfect solution for mite problems on flowers and ornamentals.

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Jim Anderson, Lost Spur Country Club
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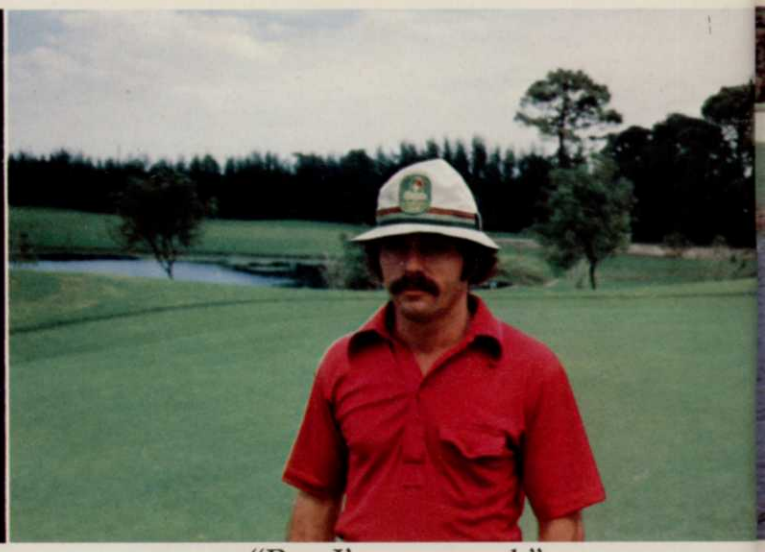
"Controlled brown patch."
Larry Bunn, Blue Hill Country Club
Canton, Mass.

"3 week control."
Chris Myers, Bloomfield Hills Country Club
Bloomfield Hills, Mich.



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Vince Spano, Hamlet Golf & Tennis Club
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Chipco® 26019 is getting the w

The word is spreading fast and it's all good. "With Chipco 26019 we've pretty well licked our disease problems and it lasts up to 21 days!" said Larry Bunn at Blue Hill C.C.

Jim Anderson, Lost Spur C.C., emphasized 21 day residual control saying "The longer time between spraying has saved money and labor to keep us within budget." And Firestone's Jim Loke said, "with 200 to 300 players per day, the long spray interva adds extra convenience."

They're all impressed with just how effective Chipco 26019 i against the toughest disease problems like dollar spot, (including benomyl resistant dollar spot) brown patch, Helminthosporium (leafspot, and melting out) and fusarium patch in the Northwest.

Bent Tree C.C. Superintendent Warren Stringer said, "Leaf-spot was epidemic in proportions here last Spring. Weeks of rain left our usual fungicides ineffective. Chipco 26019 turned the tide."

Please read label carefully, and use only as directed.

"Extra convenience."
Jim Loke, Firestone Country Club
Akron, Ohio

"What I'll use in the future."
John Monson, Broadmoor Golf Club
Seattle, Washington

"Effective against leafspot."
Warren Stringer, Bent Tree Country Club
Dallas, Texas

"Eliminated dollar spot."
Robert Williams, Maidstone Club
East Hampton, N.Y.

ord from the guys that count.

Larry Bunn noted, "we controlled dollar spot and brown patch with two applications." And Chris Myers of Bloomfield Hills C.C. said that Chipco 26019 controlled dollar spot "longer than any other fungicide he used last year."

This season, ask your Chipco distributor or Rhône-Poulenc representative about Chipco 26019...the turf fungicide that outperforms anything else you can use, with about half the number of sprays. Who says so? *You, the turf care professional.* And as far as we're concerned, that's the last word.

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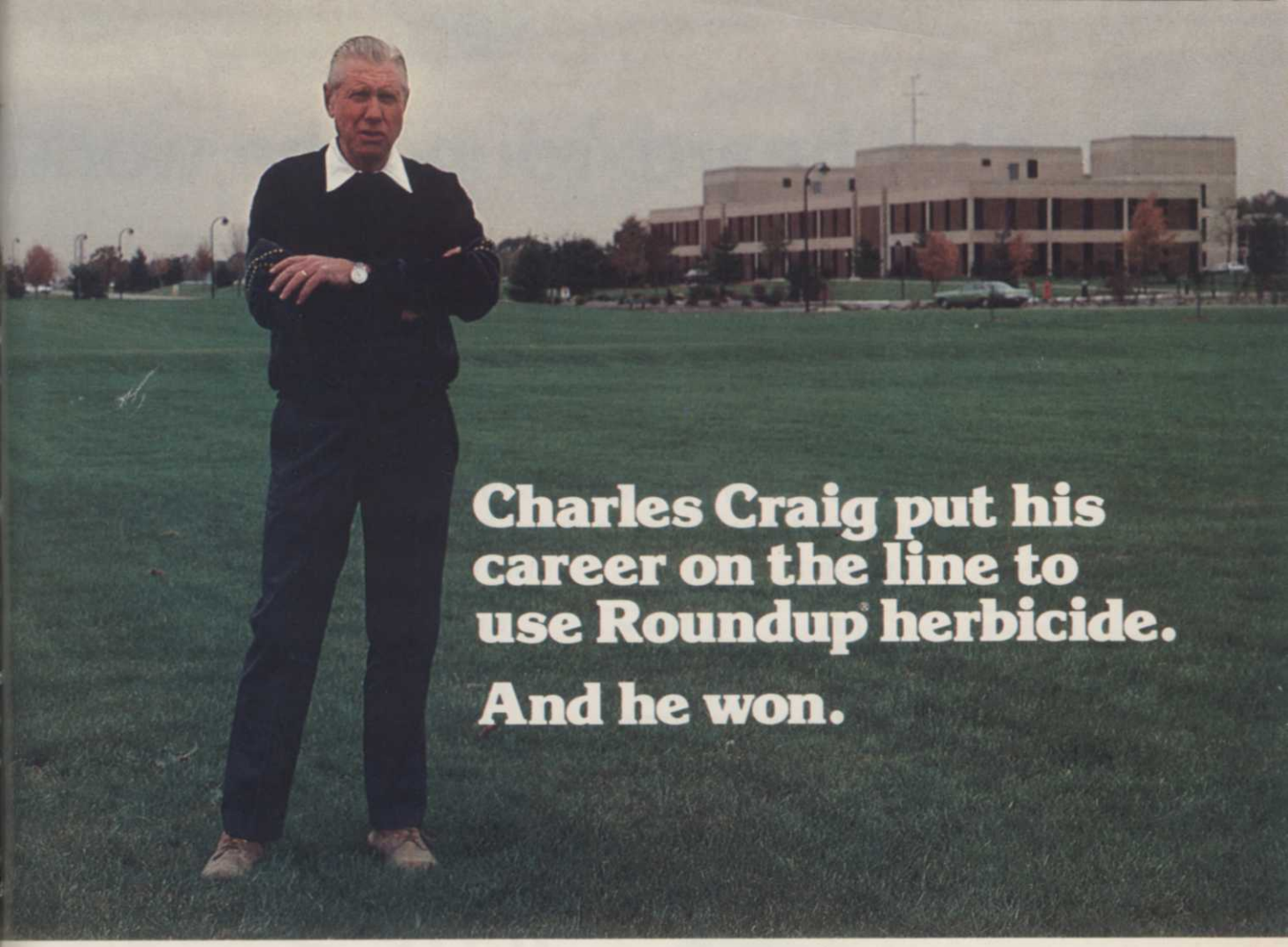

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